JPRS-UEE-84-009

27 June 1984

USSR Report

ELECTRONICS AND ELECTRICAL ENGINEERING

FBIS FOREIGN BROADCAST INFORMATION SERVICE

NOTE

JPRS publications contain information primarily from foreign newspapers, periodicals and books, but also from news agency transmissions and broadcasts. Materials from foreign-language sources are translated; those from English-language sources are transcribed or reprinted, with the original phrasing and other characteristics retained.

Headlines, editorial reports, and material enclosed in brackets [] are supplied by JPRS. Processing indicators such as [Text] or [Excerpt] in the first line of each item, or following the last line of a brief, indicate how the original information was processed. Where no processing indicator is given, the information was summarized or extracted.

Unfamiliar names rendered phonetically or transliterated are enclosed in parentheses. Words or names preceded by a question mark and enclosed in parentheses were not clear in the original but have been supplied as appropriate in context. Other unattributed parenthetical notes within the body of an item originate with the source. Times within items are as given by source.

The contents of this publication in no way represent the policies, views or attitudes of the U.S. Government.

PROCUREMENT OF PUBLICATIONS

JPRS publications may be ordered from the National Technical Information Service (NTIS), Springfield, Virginia 22161. In ordering, it is recommended that the JPRS number, title, date and author, if applicable, of publication be cited.

Current JPRS publications are announced in Government Reports Announcements issued semimonthly by the NTIS, and are listed in the Monthly Catalog of U.S. Government Publications issued by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

Correspondence pertaining to matters other than procurement may be addressed to Joint Publications Research Service, 1000 North Glebe Road, Arlington, Virginia 22201.

JPRS-UEE-84-009

27 June 1984

USSR REPORT

ELECTRONICS AND ELECTRICAL ENGINEERING

CONTENTS

UDC 681.121.89(088.8)

HARDWARE FOR EXECUTION OF ALGORITHM OF GRAPHICAL MAPPING OF SHIP LOCATION ON NAVIGATION CHART WITH ACCOUNTING FOR ASPHERICITY OF EARTH

Leningrad IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: PRIBOROSTROYENIYE
in Russian Vol 27, No 2, Feb 84 (manuscript received 20 Jun 83) pp 47-51

BORZENKO, A. Ye., BYLINSKIY, L. V., GAVRILENKO, V. I. and MEYER, V. V.,
Ryazan Institute of Radio Engineering

[Abstract] One of the algorithms of graphical mapping of a ship's location on a navigation chart is considered, an algorithm which accounts for the asphericity of the earth by calculating local scale distortions on the chart and converting nautical miles used on ships to equatorial miles used on charts. The factor $(1- e^2\sin^2\phi)^{\frac{1}{2}}$ in the integrand in the equations of motion of the automatic plotter pen in orthogonal x, y directions corresponding to meridians and parallels respectively is replaced with the factor $(1- \delta)$ ($\delta \simeq 0$ for $\phi_0 \leq 10°$ and $\delta = 4.7623\cdot10^{-5}(\phi_0-10°)$ for $\phi_0 > 10°$). This, with subsequent discretization, reduces the error of integrators and simplifies the hardware. The latter includes a trigonometric processor as an automatic dead reckoner which processes data from navigational transducers and an automatic plotting table which carries two stepper motors coupled to the dead reckoner through a scale converter. The scale converter consists of two multipliers, two 2-stage dividers, two digital integrators with a disjunctor forming a nonlinear element, a memory, a latitude setter, an equator scale setter on the chart, a summator, and an approximator. The binary multipliers and dividers, connected in cascade, form a frequency converter for tracking the distance increments. Article was recommended by Department Faculty of Electronic-Computing Apparatus Design. Figures 3; references 2: 1 Russian, 1 Western.
[130-2415]

UDC 629.7.054.5

POSSIBILITY OF DETERMINING TOPOCENTRIC EQUATORIAL COORDINATES OF ARTIFICIAL EARTH SATELLITE BY MEANS OF ASTROTRANSDUCER WITH CHARGE-COUPLED DEVICES

Leningrad IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: PRIBOROSTROYENIYE
in Russian Vol 27, No 2, Feb 84 (manuscript received 16 Sep 83) pp 52-56

GAVRILOV, V. V. and PASHOV, V. S., Leningrad

[Abstract] Use of charge-coupled devices in the astrotransducer for determining the topocentric equatorial coordinates of an artificial earth satellite is based on storage of a number of minority carriers proportional to the intensity of incident radiation and to the length of exposure time. Such a determination by the differential method requires at least three reference stars in the field of vision. The accuracy and thus the feasibility of this method is established in terms of the maximum permissible mean-square error of measurement of the rectangular coordinates in the plane of the photoreceiver array. Analytical expressions based on the relation between these measured rectanglular coordinates and the actual equatorial coordinates of the celestial object take into account only geometrical factors, for the purpose of this evaluation, indicating the functional relation between the dispersion in actual equatorial coordinates and the dispersion in measured rectangular coordinates and the dispersion in measured rectangular coordinates. Numberical data are given based on observations made using three references stars: λ Her (magnitude class 4.48, spectral class K_0), μ Her (magnitude class 3.48, spectral class G_5), ξ Her (magnitude class 3.82, spectral class K_0). The total error was calculated on a computer, with a generator of random numbers for simulation of the noise charge in each element of the photoreceiver array and with interpolation of the output sequence of signals additively mixed with noise. Tables 2; references 6: 4 Russian, 2 Western (both in Russian translation).
[130-2415]

UDC 621.371.322

INFLUENCE OF IONOSPHERIC INHOMOGENEITIES ON OPERATION OF TRANSMITTING SHORTWAVE ANTENNAS

Moscow ELEKTROSVYAZ' in Russian No 2, Feb 84
(manuscript received 23 Jul 82) pp 40-46

CHERNOV, Yu. A.

[Abstract] With the use of a beam approxiamtion, evaluations are obtained in this paper of the losses of energy in the ionosphere because of scattering as a function of the degree of scattering aad the characteristics of the transmitting antennas. Energy losses for a single sudden-change routes, and an evaluation of the reality of the accepted values of q and μ are considered. The procedure discussed in this paper makes it possible to obtain a number of practical conclusions. As an example, a comparison is made of losses and density of power flux based on the illuminated territory for several transmitting antennas: 2-, 4-, and 8-tier, having respectively, main lobes in the vertical plane with a width of 30°, 16° and 8°. Comparative data for a single sudden-change route and typical ionospheric conditions in the absence of regular horizontal gradients and with minor scattering in the ionosphere (δ_y = 1° and 2°) are shown in a table. The comparison is conducted with reference to the SGD8/4RA antenna. The paper considers only one of the essential factors affecting the relative effectiveness of one or another antenna. Consequently, only a preliminary evaluation can be made. Production of precise comparative evaluations of losses with the use of various antennas using multiple sudden-change routes, taking account of the scattering properties of the earth's surface and the angular dependence of losses in the ionosphere requires addtional analysis. Figures 7; tables 3; references 15: 7 Russian, 8 Western.
[128-6415]

IMPORTANT UNIT FOR INCREASE OF PRODUCTION EFFECTIVENESS

Moscow VESTNIK SVYAZI in Russian No 1, Jan 84 pp 26-27

PTUSHKO, P. P., chief engineer, Amur Oblast Radiotelevision Transmitting Center [ORTPSs]

[Abstract] A description is given of the television broadcasting facilities of the ORTPTs, which has a large number of low-power television retransmitters with a power from 1 to 100 watts, and the earth stations of the television satellites "Orbit," "Ekran" and "Moskva." With the addition of direct transmission of television programs on radiotelevision stations with satellites, systems of radio relay lines are used, the terminal stations of which also serve ORTPTs. Complex technological equipment, and a large amount of control-measuring apparatus and instruments require thorough knowledge on the part of personnel. According to developments and recommendations of the Central Laboratory of the All-Union Radio-Television Transmitting Station [ORPS], and proposed by innovators in various shops of ORTPTs, some units of the "Yakor'" transmitter were altered and 12 devices for stabilization and correction of television-radio stations were entered into operation, which considerably increased their reliability. Today at 69 populated points, the oblast operates television broadcasting means, which makes it possible to assure high-quality television broadcasting for more than 90% of the population for one program and 80% for two. A new, powerful radio-television station is planned for construction which will put into operation a considerable number of low-power retransmitters which will be enlarged by a network of satellite television. Figures 2.
[142-6415]

EXPEDITE SCIENTIFIC-TECHNICAL PROGRESS

Moscow VESTNIK SVYAZI in Russian No 1, Jan 84 pp 2-3

KUZ'MIN, V. A., chief, Main Scientific-Technical Administration of the USSR Ministry of Communications

[Abstract] In connection with the Decree from the CPSU Central Committee and the USSR Council of Ministers "On Measures Concerning Acceleration of Scientific-Technical Progress in the National Economy," this paper considers the activities of the scientific and design organization of the USSR Ministry of Communications, which together with the communications industry has produced a large number of types of new equipment and apparatus for all forms of communication. The qualitative indices of the new types reportedly were developed, taking account of the best world achievements. The following are examples of the long list presented of items concerned with the field of communications: 1) Equipment based on 3600 and 1920 telephone channels is produced for coaxial, main, and zone communication lines; 2) Development is continued of new forms of equipment for main communication lines with the number of channels from 420 to 10,800; and 3) Production is organized of mainly new equipment with time sharing of channels and pulse-code modulation; 30-channel equipment for municipal telephone networks; 120 and 480 channels for intraoblast and main line communications. Development of a pulse-code system using 1920 channels for main lines is completed. However, according to this paper, not all is well in the communication field. Although the introduction of new technology furthers the intensification development of communication means, not all forms of equipment in use at present fully conform to the world level. First of all this concerns switching equipment. Difficulties, for example, are found in the field of crossbar switching. Development and utilization of new types of quasi-electronic and electronic switching equipment has been delayed for an inadmissible period of time. The process of creating new communication equipment, both at the state of scientific research and experimental design operation, and at the stage of introduction into production, is protracted, which leads to premature deterioration of development up to the moment of entrance into operation. Moreover, the plants of "Promsvyaz'" and the Ministry of the Communication Equipment Industry practically do not conduct modernization of the equipment manufactured, and for years do not update it. The power capacity of communication equipment is

still great, in particular, radio relay equipment and radio transmitters--the principal consumers of electrical energy. The expenditures of labor are still great during maintenance of the lines and equipment of long-distance communication, and the facilities of radio communication, radio broadcasting and television. Plans for future activity are noted.
[142-6415]

TO IMPROVE POSTAL COMMUNICATIONS SERVICING OF RURAL POPULATION

Moscow VESTNIK SVYAZI in Russian No 1, Jan 84 pp 4-6

AFANAS'YEV, N. A., chief, Main Administration of Postal Communications, USSR Ministry of Communications

[Abstract] More than one and a half years have passed since the May 1982 Plenum of the CPSU Central Commuttee. This paper is concerned with what has been accomplished since that time for development of postal communication and improvement of servicing of the rural population, enterprises and organization of the agroindustrial complex. Five railroad post offices, three departments for transfer of post with airports, two municipal central post offices, and also a considerable number of buildings for rayon centers and village branch communications offices were constructed and entered into operation. In addition, production areas of post office centers are extended thanks to the erection of 16 prefabricated knock-down houses. Planned assignments concerned with the mechanism of production processes are completed and advanced technology introduced. In particular, 19 center enterprises, and 740 shops, rayon units and branch communications offices are mechanized. Expansion of industrial areas of junction communications enterprises and mechanization of production in addition to facilitation of working conditions makes it possible to accelerate processing of postal transmissions and to increase their safety. During the period indicated, 4,635 "OnegaIII-zE" were installed at the communications enterprises. The above items are only a few of those discussed in this paper.
[142-6415]

JOURNAL OF COMPETITION: WORK EFFICIENTLY AND QUALITATIVELY: EFFECT OF WORK IN A NEW WAY

Moscow VESTNIK SVYAZI in Russian No 1, Jan 84 pp 7-9

MAYTULINA, N. A.

[Abstract] This article is an outgrowth of the Decree of the CPSU Central Committee "On Further Development and Increase of Effectiveness of the Brigade Form of Organization and Stimulation of Work in Industry." An

example of such a brigade form of organization and stimulation of work is presented. A complex brigade of the coin-operated section of the Lyubinskiy Telephone Center of the Moscow Municipal Telephone Network, headed by senior electromechanic Vera Pavlovna Gulkina, is correctly considered one of the best in the Moscow Municipal Telephone Network. Since 1979 this collective has borne the honorary title "Brigade of Communist Labor." High discipline and responsibility permitted its conversion in 1982 to the brigade form of organization and stimulation of work. For high industrial indices, the brigade was awarded an anniversary certificate of the Moscow Municipal Telephone Network, monetary prizes and an Honorary Pennant of the USSR Ministry of Communications and the Presidium of the Central Committee of a branch trade union. Photographs: 3.
[142-6415]

EFFICIENT LABOR RHYTHM

Moscow VESTNIK SVYAZI in Russian No 1, Jan 84 pp 11-12

YUDINA, R.

[Abstract] This paper outlines the workday activities of Valentina Ivanovna Stepanova, a respected person in her municipality, who, for 16 years has been supervisor of the branch communications office of the III Group, 1st microrayon, Uvarovo, Tambovsk oblast. Her name does not leave the Post Board of the rayon communications center, for successes attained in the years of the 10th Five-Year Plan, the presentation to her of the medal "For labor prowess," and recently she was awarded the title "Best in the profession of the USSR Ministry of Communication." Not long ago an "Onegu-III-zE" was installed in her unit. This contemporary machine lightened the work of the communication operators and made it possible to increase the working conditions [kultur] of servicing. In a short time the operators of the division studied their new electronic assistant and now confidently fulfill various postal operations with its assistance. Figures 1.
[142-6415]

FIVE-YEAR-PLAN--IN 4.5 YEARS

Moscow VESTNIK SVYAZI in Russian No 1, Jan 84 p 12

SKORZHENYUK, A. S., senior engineer, laboratory, Scientific Organization of Labor [NOT], Production and Technical Communications Administration [PTUS], Moscow Oblast, and RYSUKHINA, M. G., deputy chief of service MTTS [probably Moscow Telephone-Telegraph Station]

[Abstract] In 1982 the RSFSR Ministry of Communications and the Central Committee of the trade union of communication workers, together with the Moscow PTUS conducted an All-Russian competition for telegraph operators, electricians and mailmen with respect to the delivery of telegrams, which became a school for advanced know-how, improvement of professional knowledge, and an increase of the classification of young communication workers. The competition established precisely the location of advanced know-how and disclosed the beacons with which one must compare. The present paper is concerned with the activities of the winner of the telegraph operators' competition--Tat-yana Viktorovna Butenko--a First Class Telegraph Operator of the Dubensk Municipal Communication Unit of Moscow oblast. The equipment located at the telegraph station is identified and an extended description is presented of Butenko's method of processing telegrams--preliminary keying [perforatsiya]. High professionalism and responsibility enable her each month to fulfill the output norm on the average by 138%. There is no doubt also that she will successfully fulfill the counter commitment--to complete the 5-year assignment in 4.5 years.
[142-6415]

WITH RESPECT TO TRACES OF UNPUBLISHED LETTERS: TO IMPROVE COMPETITION

Moscow VESTNIK SVYAZI in Russian No 1, Jan 84 pp 13-14

BORISOV, Ye., VESTNIK SVYAZI reviewer

[Abstract] A recent decree of the CPSU Central Comittee makes it obligatory to set up in each collective an arrangement of creative activity, exactions and discipline--such economic and organized conditions which would encourage high-grade, productive conscientious work, initiative and responsibility of communication workers. The new requirements for competition result from the development in progress of the economic mechanism, by an increased role of labor collectives, dissemination of the brigade form of organization and stimulation of labor, and the necessity for all-out strengthening of Socialist discipline. The great possibilities of competition are not fully realized because of defects in its organization, in particular at certain enterprises of the Kamchatsk Production and Technical Communications Administration [PTUS]. In the present report, Ye. Borisov discusses and replies to a considerable number of letters from members of communication units.
[142-6415]

MORE WIDELY INTRODUCE SHCHEKINSKIY METHOD

Moscow VESTNIK SVYAZI in Russian No 1, Jan 84 pp 15-17

PRISTUPA, I. T., chief, Zaporozhye Production and Technical Communications Administration [PTUS]

[Abstract] Among the ways for increasing the efficiency of production, paying for itself in practice, the Shchekinskiy method received wide acceptance at communication enterprises of the Zaporozhye Oblast. At present it has been introduced into four rayon communication centers and six separate enterprises. Introduction of the Shchekinskiy method began in 1978 when the UkSSR Ministry of Communications selected the communication center of the Melitopol'sk rayon (the largest rayon in the oblast) as the base enterprise for its introduction. This paper presents much information on new units at which the Shchekinskiy method has been introduced, as well as a long description of activities concerned with the method. Photographs 2.
[142-6415]

CONSTANTLY STRENGTHEN DISCIPLINE

Moscow VESTNIK SVYAZI in Russian No 1, Jan 84 pp 17-18

PESOTSKAYA, N. N., engineer, Scientific Organization of Labor [NOT], Magnitogorsk municipal Production and Technical Communications Administration [PTUS]

[Abstract] Collectives of the Magnitogorsk municipal PTUS developed socialist competition for strengthening labor and industrial discipline at each work place. Meetings were held to discuss the Decree of the CPSU Central Committee, the USSR Council of Ministers and the All-Union Central Council of Trade Unions "Concerning further strengthening of labor discipline and reduction of the turnover of the labor force in the national economy." A number of steps taken with respect to fulfillment of this decree are described. The turnover of the labor force for each year is reduced. On the whole, with respect to the PTUS, the turnover as concerned with the first months of 1982 was reduced to 0.1%. The author concludes that the state of discipline and the stability of a collective depends on a multiplicity of factors. But it is indisputable that the higher the technical level and the higher the standards of production, the better labor is organized, and the stricter the discipline, the smaller is the loss of working time. If the functions between employees are correctly distributed, if everything necessary is at the work place, and the most efficient methods and labor techniques are employed, time does not remain for unnecessary nursing and frequent "perekurov" [actions such as interrupting work to take a smoke]. A scientific organization of labor fixed in progressive, technically valid norms--is a guarantee of high labor discipline.
[142-6415]

BASIS OF SUCCESS--STABILITY OF COLLECTIVE

Moscow VESTNIK SVYAZI in Russian No 1, Jan 84 pp 18-21

ZVOLIKEYEVICH, A. I., chief specialist, Republic Center of Scientific Organization of Labor [NOT] and Production Administration, UkSSR Ministry of Communications; LEVIN, F. S., chief of laboratory, NOT RMTS [Republic Long-Distance Telephone Stations]; and KOTENKO, L. Ya., deputy secretary, party bureau of RMTS

[Abstract] The Republic Order of the Red Banner of Labor Long-Distance Telephone Stations of the UkSSR will soon record its 60th year. A strong, efficient collective was formed during these years. The Red Banner was awarded in 1961, and beginning in 1977 the RMTS model enterprise of Kiev municipality. Such a high status obliged the collective to apply all forces, knowledge and know-how for a continued development of production, improvement of the organization of labor, and an increase of the quality of the services made available to the national economy and the population. Beginning in 1981, for fulfillment of these problems, the purposive complex program "Labor" was introduced into the station, which contributes to the increase of efficiency of utilization of the labor resources of the enterprise. The object of the program "labor" is the further growth of labor productivity because of an increase of the technical level of production, the introduction of scientific organization of labor and administration, increase of the qualification of personnel, improvement of the work conditions, way of life, and relaxation of the workers. In cooperation with the complex political-educational measures, this program created a basis for stabilization of the labor collective of the station. A long list of activities at the enterprise is presented in the paper. It is concluded that technical redoing and improvement of labor organization cannot by itself be able to assure an enterprise such high final results. An important role in this was played by a struggle for an increase of the quality of work and a strengthening of labor, industrial and technological discipline. To this was contributed the introduction of a complex system of management of communication quality [KSUKS] based on the standards of an enterprise, typical projects for organization of work, and process charts. There are now more than 50 such documents at the station. Basically, they encompass all the structural subdivisions, their direct operation and questions of interaction. In a number of standards, problems are considered on the improvement of the organization of Socialist competition, and moral and material stimulation of workers, taking account of an attained quality of work. The standards of an enterprise determine the indices and quality level for all units: from the enterprise as a whole to each performer. The economic effect of the action of KSUKS for the years of the 11th Five-Year Plan exceeded 330 thousand rubles. The system made it possible to improve the quality of operation of the collective: the number of impairments of KSUKS in 1982 decreased in comparison with 1981 by 22%. In the social plan of the system an increase was contributed to the responsibility of each worker for the work assigned to him, and the personal interest of the managers [rukovoditel'] of all units.
[142-6415]

WEIGHTY PRODUCTION RESERVE: ZEALOUSNESS IN ALL

Moscow VESTNIK SVYAZI in Russian No 1, Jan 84 pp 21-22

MARCHIK, G.

[Abstract] Many collectives of communication enterprises are zealously managed. Especially large successes are obtained where the struggle for economy is closely connected with socialist competition. As an example, workers of the Penza Production and Technical Communications Administration [PTUS] each year includes in the socialist obligations points with respect to the economy of labor expenditures, means, and materials. Recommendations were developed with respect to the formulation of plans for organizational technical measures concerned with the economy of material expenditures and fuel-energy resources for 1981-1985. Also, in the years of the 11th Five-Year Plan, the work successfully continues of a special commission created by the chief engineer of the PTUS with the object of investigating additional resources, as well as the economic use of labor, material and energy resources. The details are presented of measures taken by various Penza units concerned with communications and the savings made are listed.
[142-6415]

TO INCREASE QUALITY OF GOODS FOR NATIONAL CONSUMPTION PRODUCED BY INDUSTRIAL COMMUNICATION ENTERPRISES

Moscow VESTNIK SVYAZI in Russian No 1, Jan 84 p 23

GUSHCHIN, Ye., correspondent

[Abstract] The regular meeting of the Presidium of the Central Committee of the trade union of communication workers considered the practical activities of the collective of the Kharkov association for "Industrial Communication Automation," striving for an increase of production and an improvement of the quality of the commodities produced for national consumption. V. N. Tverdokhlevov, the director of the association, told the members of the meeting that the collective of the enterprise produced in 1982 goods for national consumption, 1.2% greater than the plan. With respect to the production of goods for national consumption, the assignment of the first half year of 1983 was fulfilled by 101.5%. Their relative share in the overall volume of commodity production of the association reached 9.7%. These indices are the best among the enterprises of the Main Administration of Industrial Establishments (GUPP) of the USSR Ministry of Communications. Production in the association of these goods increases yearly, both in physical and monetary terms. Thus the 1983 plan with respect to the production of goods for national consumption increased in monetary terms by 7.2% in comparison

with 1982. The growth of production and the increase in quality of goods for national consumption contributed to fulfillment of the system of the complex program "Metal" designed as of 1983-1985 by an administration and trade union committee. Other activities of the collective of the Kharkiv Association are reported.
[142-6415]

REDUCTION OF LABOR EXPENDITURES DURING REGULATED MAINTENANCE OF TELEGRAPH CHANNEL PRODUCING EQUIPMENT

Moscow VESTNIK SVYAZI in Russian No 1, Jan 84 pp 24-25

TARNOPOL'SKIY, V. L., chief of laboratory of Kiev Branch of the Central Scientific-Research Institute of Telecommunications [KONIIS]; TSVIBEL', I. I., senior scientific associate; ROMANENKOVA, L. I., senior engineer, Chief Telegraph Administration [GTU], USSR Ministry of Communications; and KOMOLOV, V. M., engineer

[Abstract] At present, use is found on communication networks for the regulated (preventive, anticipating) monitor-correcting and monitor-restoration method of equipment maintenance. The regulated maintenance method involves planned systematic testing and adjustment regardless of the technical state of the equipment, and obligatory maintenance of norms for all electrical and mechanical parameters, i.e., periodic conducting of regulating work, even if the equipment as a whole functions normally. (It should be noted that the term "regulated maintenance" is used instead of the term "planning-preventive maintenance," GOST 18322-78. "System of Maintenance and Repair Technics. Terms and Definitions.") The monitor-correcting method of maintenance [KKM] proposes automatic selective monitoring of the most important and characteristic parameters of the equipment, statistical processing of the results of monitoring, search and elimination of faults only in the case when the results of monitoring emerge beyond the given norm. The monitoring restoration method of monitoring [KVM] provides for automatic monitoring of the principal characteristics of the determining quality of functioning of the equipment being monitored and immediate reduction of a normal functioning of devices, leading to deterioration of the quality of operation of the equipment. The new technology of regulated maintenance of channel producing telegraph equipment entered into the network beginning 1 January 1983. Its use makes it possible to reduce labor expenditures on maintenance of equipment, to increase the productivity of labor of technical personnel without reduction of the reliability of operation of telegraph channels. Tables 2.
[142-6415]

AUTOMATED CHECKING BY NAME OF DISPATCH ARRIVALS

Moscow VESTNIK SVYAZI in Russian No 1, Jan 84 pp 28-29

KIMBERG, A. G., engineer, Automated Control System [ASU] Division of Kaliningrad Production and Technical Communication Administration [PTUS]

[Abstract] As an experimental arrangement, the Kaliningrad division for mail transportion organized automated checking by name of dispatches during their reception from the postal carrier. A minielectronic computer, an "Elektronika-100," available in the ASU was used for this purpose. The object of the experiment was an increase of the productiveness of labor and the quality of work, contraction of the share of manual labor, operative exposure and prevention of defective output and cases of loss of dispatches. An organizational scheme of the device is presented and explained. A model is shown of information on the punched tape (produced by the operator) of a teletype during processing of checking-information documentation. Figures 1, tables 1.
[142-6415]

NEW TECHNOLOGY IS EFFECTIVE

Moscow VESTNIK SVYAZI in Russian No 1, Jan 84 pp 29-31

MITROFANOVA, N. Z., chief, switchboard shop, Chelyabinsk Long-Distance Telephone Station [MTS], VAL'KOVA, G. P., and REZNIKOV, K. L., engineers

[Abstract] In VESTNIK SVYAZI, No 1 for 1980 a paper by A. A. Dyganov and S. S. Sinayev "Information Service of Long-Distance Telephone Service [MTS]: Reserves of Efficiency" was concerned with a new technology worked out at the Kazan MTS for handling information directly at those operator's positions at which it was admitted. The Chelyabinsk MTS successfully introduced this technology to their stations, using several new technical solutions. With the introduction of the new technology, Chelyabinsk developed and introduced, for exploitation and technical reasons, a circuit for a separated consideration of non-operations. A sketch is shown of this and other parts. The present paper describes the process and a photograph is shown of the information service switchboard operator at work. With the entrance of the new technology the expenditure of time on making inquiries is shortened from 2 minutes, 10 seconds to 1 minute, 20 seconds, i.e., by 39%, and the information itself became more complete. The response to the subscriber is given at once. The output of switchboard operators increased by 30%, which made it possible to reduce the number of information service operators by six persons. It is necessary to say that the number of calls of the information service, among them incorrect, false (empty) and calls with the object of guidance of simple information constantly reduces, although but slowly, and now constitutes 23-25% of the outgoing exchange, whereas at the moment of transition to the new technology it amounted to 28%. Figures 4, tables 1.
[142-6415]

TO INCREASE RELIABILITY OF DATA OF RECORD KEEPING AND ACCOUNTING

Moscow VESTNIK SVYAZI in Russian No 1, Jan 84 pp 32-33

YANCHENKO, N. R., Chief, Planning and Financial Division of Vitebsk Production and Technical Communications Administration [PTUS]

[Abstract] Organization of precise accounting and the strictist control over the use of materials, labor, and financial resources is an indispensable condition for effective utilization of available means. In the basic directions of economic and Socialist development of the USSR in the 11th Five-Year Plan and in the period up to 1990, the necessity is stressed for increasing the quality and efficiency of record keeping as well as strengthening checking in all components of administration. The basic means for paying attention to this problem by the workers of the Vitebsk PTUS is explained. With the object of increasing the reliability of a given record keeping and accounting, a scientific-technical conference was held with respect to the problem: "Improvement of Record Keeping for Subscribers of the Municipal Telephone Network [GTS], STS [expansion unknown], and radio points (Soviet name for a loudspeaker connected to a local wire-broadcast network)," which was attended from all the units of communication operators. There were operators at this conference from the telegraph-telephone station, municipal radio rebroadcasting units, and the Orsha rayon communication center. In 1982, a two-week course was conducted for communication operators. Tables 1.
[142-6415]

TO IMPROVE PRODUCTION--RAISE QUALITY

Moscow VESTNIK SVYAZI in Russian No 1, Jan 84 pp 33-34

PASHKOVSKAYA, T. P., chief, laboratory for scientific organization of labor, Leningrad Telegraph Office

[Abstract] Technical replacement and all-around improvement of production and its organization promotes a steady increase of the efficiency and quality of labor. The Collectives of the Leningrad Telegraph Office persistently strive for rapid introduction of valuable undertakings, progressive methods of work, techniques, and technology. This, in combination with other measures--improvement of working conditions, development of socialist competition gives its results: increased output of work, improvement of the quality, and an increased condition of service. As is seen from the list of items reported, the quality of operation of the neighboring enterprises--the Leningrad Long-Distance Telephone Station and the municipal telephone network--is directly dependent on the quality of operation of the Leningrad Telegraph Office. Operation of various pieces of equipment is described and the quality of operation of the

Leningrad Telegraph Office is evaluated. The introduction and use of new techniques at various areas is only part of the measures taken at the Leningrad Telegraph Office for an increase of the quality of work. This large and complex amount of work further decreases penalties, the amount of substandard products, complaints, and the number of telegrams transmitted with breakdown of monitoring for stretches of time. [142-6415]

CHOICE OF COMPOSITION AND METHOD OF CALCULATION OF TIME NORMS DURING OPTIMIZATION OF NUMBER OF TECHNICAL PERSONNEL

Moscow VESTNIK SVYAZI in Russian No 1, Jan 84 pp 35-37

DRUZHININ, V. V., engineer

[Abstract] In a paper published in the section "Scientific Organization of Work" of the journal VESTNIK SVYAZI, Nos. 2 and 10 for 1983, procedures are offered which make it possible to find an optimum number of technical personnel with a distribution of the number with respect to qualification under prescribed organizational-technical conditions. With a large variety of operations being performed and complexes of operations already at one communications enterprise, the principal difficulty consists in accurate determination of time norms. In our class, as an example, a number of enterprises of the telegraph subbranches justified the choice of composition and method of calculation of the time norms for optimization of the number and qualifications of technical personnel, using the method of whole-numbered programming. The writer discusses the following items in detail: 1) Choice of composition of time norms; 2) Method of calculating time norms; and 3) Results of calculation of time norms with respect to data interrogation by questionnaire. As the results of calculations of the time norms show, for an increase of the precision of their determination (if in practice such an increase is required) it is necessary to enlarge several times the number of enterprises answering the questionnaire. It is necessary also to stress that for determination of the dependence of the time norms on the qualifications of the workers requires a more thorough approach of the enterprises to the responses to the questionnaire. In so doing, it is necessary to consider that the qualifications of the composition of the technical personnel directly depends on the relation of the time norm for various qualifications at each form of work. Investigation of time norms as initial data for calculation of the number and qualified structure of technical personnel with the aid of whole-numbered programming makes it possible to find the optimum number with distribution of it with respect to qualification. Tables 2. [142-6415]

FOR SAFE WORK OF LINEMEN

Moscow VESTNIK SVYAZI in Russian No 1, Jan 84 pp 43-44

LEONIDOV, L. P., nonstaff technical labor inspecor, Kharkov District Committee, Communication Workers Trade Union

[Abstract] Because linemen's work is often connected with risk, increased requirements with respect to fulfillment of the regulations for safety technics are imposed on them. There is an especial order also for leaders of line brigades, into the duties of which the creation of safe conditions of work also enter. The basis of work with respect to organizing labor is training of the linement in safety procedures. For linemen in rayon communication units [RUS] instructions are developed with respect to safety technics. On the basis of the new position concerning the order of instruction of communication workers in safe methods of work, programs of primary instruction are prepared. In them the most dangerous forms of work and the dangerous parts of the lines are enumerated. Equipment of the enterprise office with respect to work protection which plays an important role in the instruction of workers is described. For an exchange of experience with respect to the organization of safe labor conduct, checking of the professional skill of the workers of the Kharkov Production and Technical Communications Administration [PTUS] is conducted each spring and an inspection is organized of the line brigades. Conditions for the inspection are developed and the best brigades of the RUS are carefully prepared for this measure. Not all the RUS now have drilling motor vehicles. In order to emerge from this condition, a member of the Chuguyevsk RUS proposed a hand-operated rotary drilling unit [illustrated] of original construction, which is more compact and efficient than a similar unit produced by the Smolensk Plant for Commercial Equipment. In 5 minutes it is possible to bore a hole with a depth of 1.5 meter, for placing a support with a minimum expenditure of human energy. A homemade pole-setting machine is also illustrated. "It is simple, has little weight, and is convenient in operation. The pole-setting machine has been taken into the fitting out of line brigades, and the mounters comment well on it." Work conditions of linemen in winter and after thunderstorms are briefly noted. Figures 2.
[142-6415]

CONSULTATION WITH RESPECT TO LONG-DISTANCE TELEPHONE COMMUNICATION

Moscow VESTNIK SVYAZI in Russian No 1, Jan 84 pp 45-46

VINOGRADOVA, L. P., chief of division, Main Administration of Line-Cable and Radio Relay Communication Structures [GUMTS], USSR Ministry of Communications

[Abstract] Beginning on 1 February 1984 a new "Rule for use of intercity and international telephone communication" entered into effect on the Long-Distance Telephone Network. With the question: "What is the basic difference of the new rules to be used from those in operation?"--the editorial staff of VESTNIK SVYAZI directed attention to the Chief of the Division for Operation, BUMTS, L. P. Vinogradova, who furnishes 12 paragraphs of summary in the present article. With respect to introduction into effect of the new rules, an order of the USSR Ministry of Communications was issued, in which additional changes were reflected which arrived at the network after their confirmation and could not be introduced into them during the process of typesetting the text. Consequently, with respect to obtaining an order of locations, it will be necessary to introduce the changes into a text.
[142-6415]

UDC 621.395:621.315.212:654.01

PROBLEMS OF AUTOMATING OPERATION OF PRIMARY TRUNK NETWORK ROUTES

Moscow ELEKTROSVYAZ' in Russian No 2, Feb 84
(manuscript received 30 Sep 83) pp 2-4

BELOV, O. G.

[Abstract] This paper discusses various aspects of the plan for development of the Primary Trunk Network of the Unified Automated Communication System of the USSR (YeASS) for the 11th Five-Year Plan, which foresees an increase of the length of the long-distance communication channels of 1.8 times, during which it is necessary to obtain 80% of the growth as the result of labor productivity and the intensity of production processes. With the object of fulfilling these plans and the creation of a material basis for further growth of labor productivity in industry, the problem of developing new, effective methods of operation of routes and channels is placed before the workers of the Primary Trunk Network of the YeASS. Among the items concerned with the major problems of automating technological processes is the creation of a complex of technical means for organization of working places for technical personnel, separated from the technological setting of the Line Equipment Shop (LATs), i.e., organization of a Maintenance Section CTO). A list of items is presented which CTO must provide at its first stage. Another important item

discussed is concerned with various applications of microprocessors, more of which are necessary for an increase of the reliability of the system as a whole and provision for a centralized maintenance and repair of computer facilities at selected units (stations). In this connection, particular attention must be paid to the automated measuring operator's position at CTO. It is understood that automation of the technological processes for the Primary Network is complicated but it is a practicable undertaking, the solution of which requires an attentive and responsible attitude. Realization of the automation of technological processes for the Primary Network will make it possible to assure a further increase of the effectiveness of its functioning and to create a base for growth of the labor productivity of technical personnel. References: 2 Russian. [128-6415]

UDC 621.395:621.315.212:654.01

BASIC POSITIONS OF AUTOMATED SYSTEM OF OPERATING-TECHNICAL SERVICING OF PRIMARY TRUNK NETWORK

Moscow ELEKTROSVYAZ' in Russian No 2, Feb 84
(manuscript received 23 May 83) pp 5-7

BONDARENKO, V. G.

[Abstract] Work on automation of the processes of technical operation of the Primary Trunk Network (SMP) of communication of the country is conducted on the basis of a system of methods and means of computing techniques by scientists, designers and the operational organizations of the Ministry of Communications. For coordination of their activities, the basic positions are developed for an automated system of operating-technical servicing (ASOTO) of the Primary Trunk Network of the Unified Automated Communication System of the USSR (YeASS). The present paper discusses the principles of organization of the operating-technical servicing; and the assignment, construction of the structural subdivisions of ASOTO, and their problems and functions are determined. ASOTO is a combination of methods, algorithms and a complex of technical means necessary for servicing the qualitative indices of the routes, channels and equipment of the SMP within the limits prescribed. ASOTO and the automated system of operation control are component parts of a single automated system of technical operation (ASTE). ASOTO is constructed according to the territorial-multilevel principle and is a 5-level system. These levels are described and the three lowest levels are shown in a figure. The problems and functions of ASOTO are discussed at length. They are handled with the aid of subsystems: supervison (PK); present maintenance (PTTO); collection, storage, representation, documentation (SKhOD); devices for analysis of the quality of operation (UAKR). The basic principles of the structure of ASOTO are checked at the test area of the SMP YeASS. Figures 2; references: 2 Russian.
[128-6415]

UDC 621.317.3

TRENDS OF AUTOMATION OF MEASUREMENTS OF CHANNELS AND ROUTES OF PRIMARY TRUNK NETWORK

Moscow ELEKTROSVYAZ' in Russian No 2, Feb 84
(manuscript received 25 Sep 83) pp 7-10

GURIN, O. I., MEL'NIKOVA, N. F., and RYZHOVA, L. P.

[Abstract] Measurement means occupy an important part in the checking subsystem of the Automated System of Operating-Technical Servicing (ASOTO) of the Primary Trunk Network (SMP) of the Unified Automated Communication System of the USSR (YeASS), and its functions. With the assistance of these measurement means, operating-technical (periodic and occasional) checking of channels and routes is accomplished as a function of line-equipment units. Measurements of parameters are made with the object of increasing the operational reliability of a network. The present paper considers automation of measurements with the use of standard measuring instruments; use of standard measuring instruments and additional devices; creation of specialized measuring instruments; and means of measurement and equipment which assure automation of measurements. Some instruments which increase the performance of technical personnel are listed. References: 3 Russian.
[128-6415]

UDC 621.395;654.15

PRINCIPLES OF CONSTRUCTION OF COMPLEX OF TECHNICAL MEANS FOR MAINTENANCE AND ADMINISTRATION OF NETWORK CENTER OF PRIMARY TRUNK NETWORK

Moscow ELEKTROSVYAZ' in Russian No 2, Feb 84
(manuscript received 30 Nov 82) pp 10-11

SAZONOV, Ye. N., and CHERNYY, G. P.

[Abstract] In a number of undertakings of a Primary Trunk Network there is a Maintenance Section which has the function of centralized supervision of the condition of channels, equipment for the line-equipment units, power-supply units, the display of information concerning the condition of supervised objects, management of business messages, reporting of a control system, users, and others. For fulfillment of these functions the Maintenance Section is provided with a complex of technical means, the principal part of which is a modernized desk for operating technical control (POTU). On the basis of extended experience of operational enterprises, as well as the results of a survey of effective systems of operative technical maintenance and administration, specialists of the Kiev Affiliate of the Central Scientific-Research Institute of Communications developed the principle of construction of the complex of technical

means for the maintenance system and an information-executive point of a control system (KTS STO-IP). The present paper considers the functions of these units. The authors conclude that entry into network units and stations of a complex of technical means for a STO-IP will make it possible to increase the effectiveness of maintenance and operating technical control by automation of a number of processes at network points (stations) and to reduce the time for introduction into operation of automated systems on the Primary Trunk Network of the Unified Automated Communication System of the USSR (YeASS). Figures 1; references: 4 Russian (2 concerned with foreign technology).
[128-6415]

UDC 621.317.3.313

AUTOMATIC COMPLEX FOR INVESTIGATION OF CHANNELS AND ROUTES OF PRIMARY TRUNK NETWORK

Moscow ELEKTROSVYAZ' in Russian No 2, Feb 84
(manuscript received 20 Sep 82) pp 12-15

BERKMAN, N. A. [deceased], POPOVA, N. E., PONOMARENKO, V. A., ROZHDESTVENSKIY, A. A., RAKHLIN, Ya. A., and KIL'CHITSKIY, Ye. V.

[Abstract] In connection with an improvement of the Primary Trunk Network (SMP) of the USSR (YeASS), this paper is concerned with one of the most pressing problems--an increase of the quality and reliability of information transmission. This problem is inseparably connected with the necessity for objective quantitative evaluation of quality indices and the reliability of transmission channels and routes, on the basis of which the Primary Trunk Network of the country is created, and the operational checking of these indices. In order to conduct the work indicated, an Automatic Measuring Comples (KAI) was created, intended for collection, transmission, processing, and documenting of measurement information during investigations, adjustments and certification of channels and groups of routes of transmission systems in the 0.3-600 kHz range. The measurable parameters, the composition of the KAI, the purpose and description of the individual instruments and devices, and the various regimes of measurement which can be achieved are considered. An analysis of the results of the trial operation of KAI-2 showed that with the high objectivity of the results obtained of measurements, the Complex assures a considerable saving of the working time of technical personnel, freeing them from participation in most time-consuming measurements of statistical parameters and makes it possible to economize considerably on the time of occupation of the channel or route during measurement because of the possibility of conducting simultaneous measurement of a number of parameters. Figures 1; references: 4 Russian.
[128-6415]

UDC 621.395:621.315.212.46

EQUIPMENT FOR AUTOMATED SWITCHING OF CHANNELS

Moscow ELEKTROSVYAZ' in Russian No 2, Feb 84
(manuscript received 25 Mar 83) pp 15-17

ROZHDESTVENSKIY, A. A., FILIPENKOV, V. V., SAVVATEYEVA, Ye. Yu., SOSNOVIKOV, V. V., and KARELOVA, V. I.

[Abstract] Specialists of the Central Design Bureau of the USSR Ministry of Communications and the Central Scientific-Research Institute of Communications developed two versions of equipment for automated switching of channels (trakt) of the Primary Trunk Network as well as Secondary and Tertiary Channels. Development of the equipment for automated switching of channels, together with redundancy, assures: automated transfer of a defective channel into service repair; lead out of channels from operation and connection of them to measuring complexes during conduct of preventive work; switching of channels in the case of work with respect to a schedule (e.g., during transmission of newspaper pages); and automated connection of equipment for high-frequency transit and automatic correction. The results of line tests of prototypes of the equipment showed the advisability of its introduction into the communication networks of the country. It is planned to begin serial production of the equipment in 1984. Figures 2; references: 3 Russian.
[128-6415]

UDC 621.398.4

STRUCTURE OF SECTION TELEMEKHANIKA FOR PRIMARY TRUNK NETWORK

Moscow ELEKTROSVYAZ' in Russian No 2, Feb 84
(manuscript received 20 Oct 83) pp 17-19

BONDARENKO, V. G., GAPLICHUK, L. S., MURATOV, L. I., and SHNAYDERMAN, M. G.

[Abstract] A precise equivalent of the Russian word "telemekhanka" does not exist in English. In the English literature the word "telemetry" is often used. The paper is concerned with realization of an automated system of operation of the Primary Trunk Network of the Unified Automated Communication System of the USSR (YeASS), which requires a review of the concept of the functions and structure of Section Telemetry. This is caused, on the one hand, by the necessity to centralize assembling and processing of telemetry information, and on the other, by the extensive entry into the network of control computer means. The most effective approach, in which telemetry fulfills the roles of numerous specialized terminating complexes by a single central computer complex, also guarantees realization of the majority of functions placed at present on the operator. It is advisable to place the principle of time sharing of signals at the

basis of the prospective structure of section telemetry. This permits, as a terminating set of telemetry, a number of transmission systems (K-3600, K-1920P, K-300) to use a Control Computer Complex (CCC), and with the help of a simple tracking device to assure the interaction of the CCC with telemetry devices of all types. A telemetry device is proposed which makes possible simple means of accomplishing centralized checking of transmission lines not adapted for operation in an Automated System of Operating-Technical Servicing (ASOTO) without alternation of the the existing types of devices for section telemetry. Figures 2; tables 1; references: 2 Russian.
[128-6415]

UDC 621.391.83.004.5

CHECKING UTILIZATION OF NETWORK ROUTES

Moscow ELEKTROSVYAZ' in Russian No 2, Feb 84
(manuscript received 21 Feb 83) pp 19-23

SURKOV, Yu. P.

[Abstract] The paper considers the problem of checking the utilization of network routes, choice of the parameters to be checked, determination of the threshold of analysis, sample checking of the utilization, determination of the parameters of a plan for statistical checking, determination of the criteria for operational checking, and experimental data. The author concludes that the methods proposed in this paper for checking utilization can be applied to a primary network based on routes with the number of channels from 12 and above (both of grouped and line). Realization of these methods was achieved on a model of a pickup for checking utilization of a line route, the K-1920. Tests and trial operation of the pickup gave positive results, which makes it possible to recommend for admission the proposed criteria for checking utilization. However, specialized devices are required for use of these methods, which assure measurement of the average-minute powers of the signals.. At present, development of such a device is completed--the signal power meter (IMS-2,1) intended for checking utilization of group routes. For checking the utilization of line routes it is advisable to develop a specialized checking device. It is noted that the methods of sample checking can also be used for checking other statistical characteristics of channels and routes, e.g., noise in channels. Figures 2; tables 3; references: 3 Russian.
[128-6415]

UDC 621.397.7

SOME DEVELOPMENT OF TRENDS OF FACSIMILE COMMUNICATION TECHNOLOGY

Moscow ELEKTROSVYAZ' in Russian No 2, Feb 84
(manuscript received 12 Apr 82) pp 24-27

MIKHAYLENKO, V. S., SIVAKOV, V. T., and FOT, K. N.

[Abstract] The paper presents a nontechnical review of work conducted in facsimile communication technology. The principal trends in improvement of facsimile equipment are listed as: a reduction of the time for transmission of communications because of a decrease of redundancy; semiautomatic and automatic transmission and reception of communications; use of autoloaders, which make it possible automatically to transmit documents (without interference of an operator); use of microprocessors for encoding, control, diagnostics, and solid-state devices in a scanning system and multielectrode recording devices, plane electronic scanning; and expansion of functional potentialities. References 4: 2 Russian, 2 Western.
[128-6415]

UDC 621.397.7:654.143

INTEGRATED TELEGRAPH-FACSIMILE TERMINAL: MEANS OF REALIZATION

Moscow ELEKTROSVYAZ' in Russian No 2, Feb 84
(manuscript received 3 Aug 82) pp 27-30

ANTONISHIN, V. Z., KOROP, B. V., OGOSHKIN, A. Ya., PISARCHUK, V. M., and SIVAKOV, V. T.

[Abstract] The development of an integrated telegraph-facsimile terminal is described. Problems of introduction, the principles of construction and tests of its realization are considered. The authors conclude that it is necessary to begin creation of the terminal with the development of a combined arrangement, using as input-output devices the series-produced equipment RTA-80 and T-100, and the equipment group 1, e.g., the "Shtrikh." Use in the future of a universal symbol-facsimile printing device will make it possible to change to a mixed performance. Operating experience with such units gives important data for development of a special terminal with a mixed performance. Figures 3; references 6: 4 Russian, 2 Western.
[128-6415]

UDC 621.391.828:621.391.133

ADAPTIVE COMPENSATION OF RADIO INTERFERENCE IN CABLE COMMUNICATION LINES

Moscow ELEKTROSVYAZ' in Russian No 2, Feb 84
(manuscript received 18 May 81) pp 31-33

KURSHEV, N. V.

[Abstract] The paper is concerned with one of the ways to increase the effectiveness of suppression of radio interference and to assure its high stability in time, i.e., by use of coherent compensation of radio interference with automatic correction of the compensated voltage with respect to a minimum remainder of interference at the input of the linear amplifier. A block diagram is presented of an adaptive device, which assures coherent compensation of radio interference. An experimental model of an interference suppressing device (ISD) created on the basis of this unit was constructed using an integrated microcircuit with a dynamic load. The basic circuit of an adjustable amplifier is presented. A magnetic antenna tuned to the frequency of the interfering station is used as an interference pickup circuit in the ISD. Use of this antenna makes it possible to obtain a signal with the smallest level of constant noise. Trial operation showed that the stability of compensation for radio interference with respect to carrier frequency amounts to 22-25 dB, and with respect to side bands to 12-16 dB. Correction of the compensation signal is accomplished automatically. Figures 4; references: 3 Russian.
[128-6415]

UDC 621.315.145.011.21:621.3.029.4/6

DETERMINATION OF CONVERGENCE EFFECT IN TWO-WIRE LINES WITH DIFFERENT CYLINDRICAL CONDUCTING WIRES

Moscow ELEKTROSVYAZ' in Russian No 2, Feb 84
(manuscript received 26 May 81) pp 34-37

KALYUZHNYY, V. F.

[Abstract] Formulas (numbers 10 and 11 in this paper) are found by which the components can be derived of an electromagnetic field E_z and H_ϕ at a random point of the medium, occurring between the conducting wires of a two-wire line with different parameters and dimensions. On the basis of the component of the field E_z and H_ϕ at the surface of a conducting wire, it is possible by formulas 12 and 13 in the paper to determine the change of the longitudinal parameters of transmission as a consequence of the effect of convergence with the adjacent conducting wire. In media which approach dielectrics with respect to their characteristics,

the effect of convergence is displayed more strongly as compared with the conducting or ferromagnetic media in which the effect of convergence between the conducting wires is practically absent. Figures 1; references 8: 7 Russian, 1 Western.
[128-6415]

UDC 621.391.82

COMPENSATION METHOD OF SUPPRESSING MUTUAL INTERFERENCE ON OVERHEAD COMMUNICATION LINES

Moscow ELEKTROSVYAZ' in Russian No 2, Feb 84
(manuscript received 11 Feb 82) pp 37-39

ZAKHAROVA, Kh. M.

[Abstract] The paper finds that the results of an experiment concerned with the compensation method used for a decrease of the mutual effect between the circuits of overhead communication lines (OCL) made of nonferrous metals verified the advisability of its use, and, as was shown by a one-year test of the operation of compensating devices, attainment and maintenance of normalized values of the shielding between the circuits are possible. The compensation method is particularly effective for OCL, constructed and operated in districts with extreme natural conditions. For the conditions of the Dagestansk ASSR, the periodicity of conducting check measurements of shielding must amount to 10-12 times a year. Check measurements are also necessary after repair work is conducted. As was shown by the preliminary investigation of the mutual effects between V-12 transmission systems with a serviceable condition of the OCL, the compensation method of weakening the mutual effect can be satisfactorily employed only in the upper frequency bands of the system, i.e., in the 96-144 kHz range. Figures 2; references: 2 Russian.
[128-6415]

UDC 621.396.4.029

INVESTIGATION OF CHARACTERISTICS OF SIGNAL BASED ON ABOVE WATER AND COASTAL INTRACONTINENTAL OPEN ROUTES

Moscow ELEKTROSVYAZ' in Russian No 2, Feb 84
(manuscript received 23 May 83) pp 46-51

DARIZHAPOV, D. D. and CHIMITDORZHIYEV, N. B.

[Abstract] The paper investigates the characteristics of a field and the effect of meteorological factors on the propagation of radio waves on routes

subjected to the action of atmospheric processes which are produced above large intracontinental water basins such as Lake Baikal. This is necessary for improvement and development of new radio relay systems and maintenance of radio relay lines under the same diverse physical-geographic conditions, during which varied physical mechanisms are produced for formation of heavy fading and anomalous high levels of radio signals. The measurements were conducted during 1981-1982 on two routes, one of which passed along the shores of Lake Baikal, and the other above its surface. The meteorological conditions of the route and the results of radio surveys are presented. The authors conclude that dispersion of the statistical distribution of heavy fading of signals on the routes investigated is smaller than on similar routes of sea and seaside regions under moderate climate conditions. Such a trend is also observed on corresponding land routes. These conditions are found in good agreement with the calculated stability of a signal obtained by a precise formula for coefficients characterizing the climatic conditions $\xi = 1.5$. Thus, the above-water and coastal intracontinental routes of this climatic zone under conditions of propagation of radio waves approach the characteristics of northern high-latitude seaside radio lines with a direct line of sight. The absence of regular average attenuations of signals with respect to the levels of free space on oblique routes adjacent to water, their significant stability and the comparatively large duration of deep fading indicate certain distinctive features of the fine structure and dynamics of the surface troposphere in the regions investigated. Figures 5; tables 4; references 10: 9 Russian, 1 Western.
[128-6415]

UDC 537.311.33

ANALYSIS OF CRITICAL PARAMETERS OF ELECTRIC CURRENT IN THE CASE OF PULSED HEATING OF CONDUCTING MEDIA WITH MANY CRACKS

Kiev TEKHNICHESKAYA ELEKTRODINAMIKA in Russian No 1, Jan-Feb 84
(manuscript received 4 Jun 82) pp 24-26

KOVALEVSKIY, A. F.

[Abstract] High-power pulsed current supplies have been developed recently for the pulsed electromagnetic treatment of inhomogeneous materials. Choosing the optimal parameters for such supplies requires a consideration not only of the pulsed electromechanical effect on the metal, but also the specific features of pulsed heating of such heterogeneous media. This paper is a qualitative analysis of the pulsed heating of such conductive materials covered by cracks, taking into account the nonuniform distribution of the electric field and current in them, as well as the Joule energy dissipation during the heat treatment. The case of moderate pulse widths is analyzed, when the nonsteady-state terms in the electrodynamic equations can be neglected and the electric field and current distributions in the fissured medium can be determined from a solution of the steady-state problem, disregarding diffusion terms in the thermal conductivity equations. Because of the considerable difference in the time characterizing the electromagnetic and thermal inertia of metals, the range of pulse widths and current rise times satisfying these requirements is wide and can be realized through an appropriate choice of the electrical parameters of the discharge network. The Joule energy dissipation density in the region of a crack is found analytically and it is shown that with finite conductivity of the medium filling the inhomogeneity region, the level of Joule heat dissipation in this area can exceed the maximum heat dissipation of the matrix in the case of small heat capacities and low melting points of the filler. This can result in its melting. No sample numerical calculations or applications are cited. Figures 3; references: 5 Russian.
[149-8225

UDC 681.3

SELECTION OF SERVICE DISCIPLINE AND RESPONSE SPEED OF PROCESSOR IN DIGITAL CONTROL SYSTEMS

Leningrad IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENITY: PRIBOROSTROYENIYE in Russian Vol 27, No 2, Feb 84 (manuscript received 20 Dec 82) pp 34-38

ALIYEV, T. I., Leningrad Institute of Precision Mechanics and Optics

[Abstract] The fundamental constraint on the response speed of a control system is that the mean dwell-time of requisitions in the system be shorter than the maximum allowable one for a given class of requisitions. The problem of designing a digital control system with a processor is accordingly subdivided into three stages. First the lowest processor speed is determined at which the entire queue of requisitions will still be processed within that constraint. Then the optimum service discipline is selected, namely the elements of the prioritization matrix are determined which will satisfy that constraint at the minimum possible processor speed. Finally, with such a service discipline established, the optimum processor speed is determined which will meet a given performance criterion at the minimum cost. These design procedures are formulated in terms of appropriate equalities and inequalities for the general case of a digital control system serving M classes of requisitions, those in each class forming a simple data flux characterized by an intensity. The amount of computer labor, measured by the number of operations involved in processing one requisition of any given class, is assumed to be a random quantity with an arbitrary distribution characterized by mathematical expectation and variance. Article was recommended by Department Faculty of Computer Engineering. References 5: 4 Russian, 1 Western (in Russian translation).
[130-2415]

UDC 681.3.05

ORGANIZATION OF COORDINATE PROCESSING OF VIDEODATA IN 'SINGLE INSTRUCTION--MULTIPLE DATA' REAL-TIME SYSTEMS

Leningrad IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENITY: PRIBOROSTROYENIYE in Russian Vol 27, No 2, Feb 84 (manuscript received 12 Apr 83) pp 39-43

YEREMEYEV, V. V. and SEREDA, N. V., Ryazan Institute of Radio Engineering

[Abstract] Fast coordinate transformations of input videodata for automatic image recognition and analysis are considered, such transformations being generally describable by the system of equalities $X = \underline{\text{ent}}\,[F(x,y)+0.5]$, $Y = \underline{\text{ent}}\,[G(x,y)+0.5]$, $B(X, Y) = b(x,y)$ with $X = \overline{0,N-1}$, $Y = \overline{0,M-1}$, $x = \overline{0,n-1}$, $y = \overline{0,m-1}$ (x = number of element in line, y = number of line in image, b = brightness of element). Processing by computer in real time is possible with all processors operating in the "single instruction-multiple data" mode. It requires an appropriate organization of sequential input and parallel calculations as well as of the data exchange between processors. The exchange time can be shortened, although not necessarily minimized, by shifting each image line so as to minimize the number of data transfers. A simple algorithm with two comparison tests has been devised for selection of the corresponding monitor vector pair. Article was recommended by the Ryazan Institute of Radio Engineering. References: 2 Russian. [130-2415]

UDC 681.7.013.8:771.534.5

SPACE-TIME PRIZ TYPE LIGHT MODULATOR WITH ENHANCED PHOTOSENSITIVITY

Novosibirsk AVTOMETRIYA in Russian No 1, Jan-Feb 84 (manuscript received 16 Sep 83) pp 108-109

[Paper by V.A. Gusev, S. I. Demenko, V. A. Detinenko, and V. K. Malinovskiy Novosibirsk]

[Text] Devices capable of real-time spatial modulation of a light beam are needed for the fast optical processing of information, i.e. space-time light modulators (PVMS). The major requirements placed on space-time light modulators are formulated in [1]: a resolution of 20 to 200 lines/mm, a dynamic range of 20 to 60 dB, no less than 10^7 "read--write" cycles and a sensitivity of 10^{-7} to 10^{-9} J/cm^2.

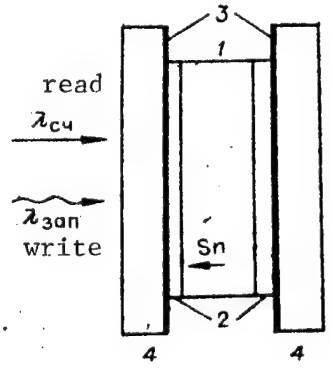


Figure 1.

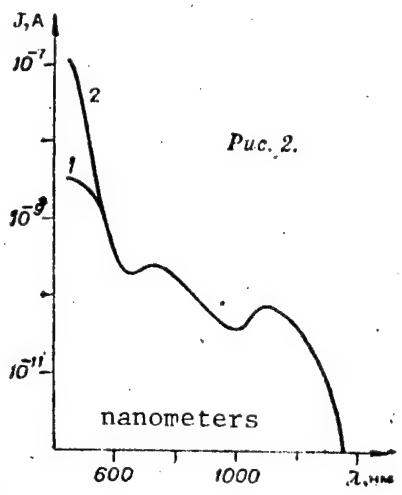
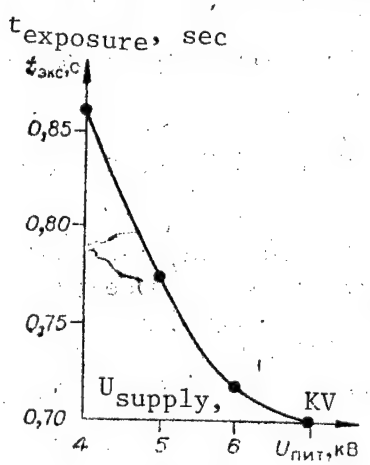


Figure 2.

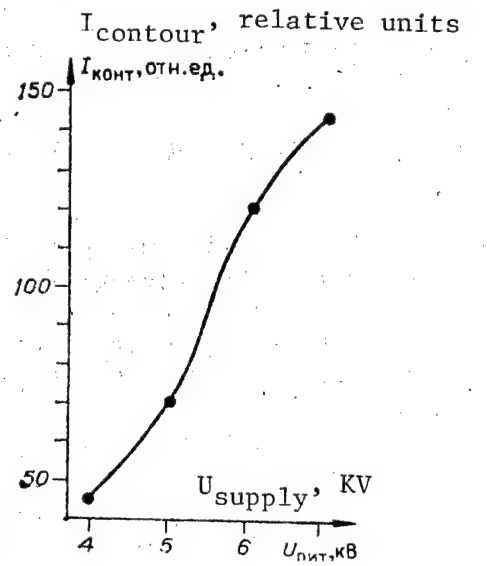
At the present time, PRIZ type light modulators meet these requirements, with the exception of sensitivity. It is reported in paper [2] that the sensitivity of a PRIZ space-time light modulator is $5 \cdot 10^{-6}$ J/cm^2 when the wavelength of the write beam is 450 nm.

Results of studies of the design of a PRIZ space-time light modulator having enhanced photosensitivity to the recording radiation (λ = 400 to 500 nm) are presented in this paper. The studies were performed with modulators fabricated from $Bi_{12}SiO_{20}$ monocrystals with an orientation of [III] and a thickness of 1 mm; the space-time light modulators took the form of a transmittance structure (Figure 1) where 1 is the $Bi_{12}SiO_{20}$ crystal doped with tin, 2 is optical glue, 3 is the transparent electrode (In_2O_3) and 4 is glass plates. The recording beam was derived from the spectrum of a PRK-120 lamp, and where necesary, was attenuated by means of a set of light filters. The measurement of the spectral curve for the photocurrent was made using a set-up consisting of a light source (a KGM-150 lamp), a grating monochromator (MDR-23), a voltage source (B5-24) and an autorecorder (a KPS-4).



Puc. 3.

Figure 3.



Puc. 4.

Figure 4.

The $Bi_{12}SiO_{20}$ crystals used in the PRIZ devices were doped with tin by means of diffusion. The photosensitivity of crystals doped with tin increased by a factor of more than 60 in the 400 to 500 nm range. The spectra of the photoconductivity of $Bi_{12}Si_{20}$ specially undoped (curve 1) and doped with tin in the solid phase (curve 2) (T = 298 °K, U = 200 volts) are shown in Figure 2.

The sensitivity of the devices based on the original and tin-doped crystals was measured in the experiments which were performed. With a supply voltage of 1.5 KV and an exposure time of 400 msec, the exposure needed to register the recorded image was $5 \cdot 10^{-6}$ J/cm^2 with the control device and $8 \cdot 10^{-8}$ J/cm^2 with the device using the doped crystal, i.e., the light intensity needed to record an image in the case of a constant exposure time was 63 times less than for the control device.

We studied the resolution of the devices. The image of calibrated wires of various diameters was recorded using a PRIZ type space-time light modulator. The read-out image was observed in a measurement microscope. The contours could be visually observed when the wire thickness was 10 μm. In this case, with a decrease in the wire diameter, the width of the outline also decreased from 40 down to less than 10 μm. The slot image from the monochromator was

also recorded in the same way. The recording was visible when the slot width was 12 μm. However, with an increase in the slot width, the width of the outline remained practically constant and amounted to about 50 μm.

When the modulator supply voltage was increased, a drop was noted in the exposure time (for the case of a constant write beam intensity) needed to achieve the maximum contrast of the contour (Figure 3).

The intensity of an outline recorded on the imaging device square (5 x 5 mm) is shown in Figure 4 as a function of the supply voltage. The background pedestal is independent of the supply voltage and is a constant. With an increase in the supply voltage, the contrast of the contour also increases and reaches a value of 360:1 when U_{supply} = 7 KV. Further boosting the voltage was limited by the electrical strength of the device. It must be noted that the level of the background (noise) pedestal for modulators made from doped crystals is 50% lower than for the control devices when reading coherent light (λ = 632.8 nm).

Thus, PRIZ type space-time light modulators have been built with $Bi_{12}SiO_{20}$ monocrystals doped with tin, having the following parameters: a resolution of more than 50 lines/mm, a dynamic range of 51 dB, the number of "read-write" cycles is unlimited and the sensitivity is $8 \cdot 10^{-8}$ J/cm^2 when λ_{write} = = 436 nm.

BIBLIOGRAPHY

1. Petrov M.P., Stepanov S.I., Khomenko A.V., "Fotochuvstvitel'nyye elektro-opticheskiye sredy v golografii i opticheskoy obrabotke informatsii" ["Photosensitive Electro-Optical Media in Holography and Optical Information Processing"], Leningrad, Nauka Publishing House, 1983.

2. Berezkin V.I., Khomenko A.V., "Spektral'naya chuvstvitel'nost prostranstvennogo vremennogo modulyatora sveta tipa PRIZ" ["Spectral Sensitivity of PRIZ Type Space-Time Light Modulators"], PIS'MA ZHTF [LETTERS TO THE JOURNAL OF TECHNICAL PHYSICS], 1980, 1980, Vol 6, No 20.

8225
CSO: 8144/1290

UDC 621.315.592

SUBMILLIMETER PHOTOCONDUCTIVITY OF EPITAXIAL GALLIUM ARSENIDE WITH ISOVALENT Sb DOPING MATERIAL

Leningrad FIZIKA I TEKHNIKA POLUPROVODNIKOV in Russian Vol 17, No 9, Sep 83 (manuscript received 30 Mar 83, after revision 22 Apr 83) pp 1579-1582

BERMAN, L. V., State Scientific Research and Planning Institute of the Rare Metals Industry, Moscow

[Abstract] The photoconductivity of pure (N_D less than $5 \cdot 10^{15}$ cm^{-3}) epitaxial GaAs at wavelengths of 50 to 400 micrometers and 4.2°K has a spectrum in which the most intense line (281 micrometers) corresponds to the optical transition of the impurity atom from the 1s ground state to the 2p first excited state. The width of this 1s-2p line correlates with electrophysical parameters measured at 77°K only in the case of homogeneous layers. Measurement of the 1s-2p line width allows an assessment of a small impurity content and the homogeneity of an n-GaAs layer. This paper demonstrates that a comparison of the form of the 1s-2p line in the submillimeter photoconductivity and optical transmittance spectra of gallium arsenide doped with isovalent antimony reveals an electrical inhomogeneity in such epitaxial layers. The occurrence of the inhomogeneity is also indicated by the lack of conformity between the 77°K electrophysical parameters and the photothermal ionization line width in the photoconductivity spectrum. This inhomogeneity is of a singular nature and differs from the known types of inhomogeneities: conducting inclusions in a pure matrix or high resistance inclusions in a conducting matrix. The GaAs:Sb layers apparently consist of sections which are not linked to each other, but separated from the conducting matrix by barriers which impede the current flow. The appearance of such inhomogeneities is most probably related to the increase in the dislocation density when n-GaAs is doped with Sb. Figures 4; tables 1; references: 8 Russian. [102-8225]

UDC 621.315.592

NATURE OF DEFECTS AND SPECIFIC FEATURES OF THEIR FORMATION DURING IRRADIATION OF NEUTRON-DOPED SILICON

Leningrad FIZIKA I TEKHNIKA POLUPROVODNIKOV in Russian Vol 17, No 9, Sep 83 (manuscript received 15 Feb 83, after revision 3 May 83) pp 1601-1603

LUGAKOV, P. F. and LUK'YANITSA. V. V., Scientific Research Institute for Problems in Applied Physics, Belorussian State University imeni V.I. Lenin, Minsk

[Abstract] Compensation and recombination defects were produced in neutron-doped silicon with an initial resistivity of 250 ohm · cm and a charge

carrier lifetime of 120 microseconds (T = 300°K) by irradiation with ^{60}Co gamma quanta at a temperature of 50°C or less. The Hall coefficient (R_H) and charge carrier lifetime in such doped and zone refined control samples (the latter heat treated for 2 hr at 800°C) of silicon were measured as a function of the temperature and dose; these data were used to determine the rate of formation of radiation defects and the coefficients for the radiation variation in the charge carrier lifetime of these materials. The formation rate of E-centers is approximately an order of magnitude smaller in the neutron-doped silicon as compared to the control samples. There are almost twice as many interstitial radiation defects at a level of E_c - 0.17 eV than in the control group. A decrease in the annealing temperature of some radiation defects is observed in the doped silicon. This is attributed to the presence of impurity-defect pile-ups, which are produced during the high temperature treatment. These electrically neutral pile-ups are drains for the vacancies generated by the gamma quanta, because of the elastic stress field surrounding these defect clusters. The authors are grateful to I. I. Kolkovskiy for his assistance in measuring the charge carrier lifetimes. Figures 2; tables 1; references 8: 5 Russian; 2 Western; 1 Western in Russian translation.
[102-8225]

UDC 621.382.3

STUDY OF INTERNALLY OPTICALLY COUPLED TRANSISTORS

Leningrad FIZIKA I TEKHNIKA POLUPROVODNIKOV in Russian Vol 17, No 9, Sep 83 (manuscript received 26 Apr 83) pp 1618-1622

ANDREYEV, V. M., ZADIRANOV, Yu. M. KOROL'Kov, V. I. ROZHKOV, A. V., and YAKOVENKO, A. A., Physics and Engineering Institute imeni A. F. Ioffe, USSR Academy of Sciences, Leningrad

[Abstract] Transistors with internal optical coupling (optotransistors) were produced by liquid phase epitaxy in two stages. Layers of undoped GaAs from 20 to 50 micrometers thick were grown in a quartz vessel on n^+-GaAs(Te) substrates. The use of undoped layers at the collector allows working voltages of up to 500 V. Then a P-p-N heterostructure with a narrow band layer of p-$Al_{0.05}Ga_{0.95}As$ contained between two wideband layers was grown in a temperature range of 600 to 820°C on an n^+-n^0 substrate in a graphite crucible. The level of the potential barrier and the difference in the indices of refraction at the boundary of the active region and the P-base are less than at the boundary with the N-emitter. A greater part of the radiation propagates toward the collector because of the greater internal reflection from the boundary of the active region with the N-emitter, thus reducing losses while increasing the emitter current gain. Photolithography was used to etch the resulting structure so as to produce mesas with diameters of 0.3 to 1 mm. The collector junction capacitance

did not exceed 40 pF for a collector area of $4 \cdot 10^{-2} cm^2$. The equivalent circuit of these structures is analyzed, showing the transmission of the electrical signal from the emitter to the collector by its conversion to light at the emitter junction and back converting the light at the collector. An expression is given for the emitter current gain, which was a maximum of 0.8, resulting in a maximum beta gain in a common emitter configuration of 4. The experimental studies of the static and dynamic parameters of these transistors demonstrate their promise as high-power switching devices in the nanosecond range. When used as constituents of a thyristor, such structures make it possible to eliminate the comparatively slow diffusion-drift processes in the base regions of a thyristor during switching and sharply improve the switching time dE/dt, di/dt as well as the durability of pulsed thyristors. The authors are sincerely grateful to Zh. I. Alferov for his interest in the work and fruitful discussion of the results, and T. P. Fedorenko and B. V. Yegorov for assisting in the fabrication of the experimental samples. Figures 5; references 14: 7 Russian, 7 Western.
[102-8225]

UDC 621.315.592

LOCALIZED STATES AND PHOTOINDUCED CHANGES IN CHALCOGENIDE GLASSES

Leningrad FIZIKA I TEKHNIKA POLUPROVODNIKOV in Russian Vol 17, No 9, Sep 83 (manuscript received 26 May 82, after revision 13 May 83) pp 1627-1630

BERCHA, D. M., MIKLA, V. I., MAR'YAN, M. I., SEMAK, D. G. and KIKINESHI, A. A., Uzhgorod State University

[Abstract] The existence of charged defect centers is responsible for a considerable part of the localized states in the forbidden band of chalcogenide glass semiconductors. These centers influence the nature of charge carrier transport in conductivity, photoconductivity and drift process, and play an initiating part in reversible photoinduced changes of the optical constants. A change in the charge state of local centers when irradiated by light with a quantum energy on the order of the forbidden band width or when heated leads to a local rearrangement of the atomic bonds, which affects the changes in the physical and chemical properties of chalcogenide semiconductors. The interrelationship between the changes in the charge state of the glass matrix and the change in the physical and chemical parameters of such materials is analyzed in this paper within the framework of a model of a statistically unordered system of anisotropic structural elements, which takes into account the topological anisotropy of the structure of such glasses. This model, which accounts for specific features of the interatomic interaction, is used to study the mechanism of photoinduced changes in the parameters of chalcogenide semiconductors. Sample calculations of the photostimulated

change in the softening temperature and volume of AsSe chalcogenide glasses using the proposed model are found to be in good agreement with data from the literature. The mechanism governing the changes caused by illumination has two stages: 1) The rearrangement of the electron subsystem; 2) The formation of stable structural states. Figures 1; references 14: 4 Russian; 3 Russian in English translation; 6 Western; 1 Western in Russian in Russian translation.
[102-8225]

UDC 621.315.592

SLIGHTLY DECAYING SLOW EDDY ELECTROMAGNETIC WAVE IN SEMICONDUCTORS

Leningrad FIZIKA I TEKHNIKA POLUPROVODNIKOV in Russian Vol 17, No 9, Sep 83 (manuscript received 23 Feb 83, after revision 4 Mar 83) pp 1672-1673

POZHELA, Yu, K., TOLUTIS, R. B. and EBERSONAS, T. S., Institute of Semiconductor Physics, Lithuanian SSR Academy of Sciences, Vilnius

[Abstract] Eddy-type waves induced in a semiconductor wafer were studied using phase interferometry in the far field of an exciting transducer driving he semiconductor. An RF oscillator powered the transducer at frequencies of 20 to 1,200 MHz. The eddy wave field passing through the semiconductor was picked up by a sensor; the wave signal was added to a reference signal, matched in phase to a signal coming directly from the exciting to the pickup transducer without the sample in between. The combined signal was fed to the Y input of an X-Y plotter; the voltage from the Hall pickup was fed to the X input. Samples of n-InSb with thicknesses of 7 and 15 mm and more than 50 mm square were placed in magnetic fields of 0 to 2 T. It is shown that the RF inhomogeneous magnetic or electric field produced in a local region of such semiconductors is responsible for vortex motion of the charge carriers and excite a slightly decaying local eddy-type magnetoplasmic wave along the constant magnetic field. The magnetic fields of this wave have a longitudinal component. The distribution of the eddy wave magnetic field intensity was measured in a plane perpendicular to the permanent magnetic field and the data used to plot the total output signal voltage as a function of the distance between the exciting and detecting transducers, as the pickup 1 mm in diameter was moved parallel to the plane of the sample relative to the exciting transducer. The attenuation of the eddy-type waves is illustrated graphically. The behavior of such waves can be partially accounted for by the presence of Hall currents accompanying the wave, which produce nonuniformity of the plasma density. Such effects should be taken into account in the dispersion equation for local waves, expecially in a rarefied plasma at high frequencies. Figures 3; references 2: 1 Russian, 1 Western.
[102-8225]

UDC 621.382.6

PARAMETERS OF INHOMOGENEOUS SEMICONDUCTORS FOR MAGNETORESISTORS

Kiev TEKHNICHESKAYA ELEKTRODINAMIKA in Russian No 1, Jan-Feb 84
(manuscript received 3 Nov 82) pp 9-15

VASETSKIY, Yu. M., GORODZHA, L. V. and YEMETS, Yu. P.

[Abstract] The sensitivity of semiconductor magnetic field sensors is governed by the following factors: 1) The change in the resistivity; 2) The Hall coefficient and 3) The Hall mobility. When the semiconducting material is inhomogeneous through its volume, the change in these parameters in a magnetic field is also affected by the inhomogeneities. This paper is an analysis of the impact of inclusions (their shape, concentration and electrical properties) on these three factors for magnetically sensitive resistors based on inhomogeneous semiconductors having an ordered structure. An expression is derived for the magnetoresistance of such sensors in terms of the magnetoresistance of the material and the angle between the orientation of the inclusions and the current flow. Conducting inclusions in structurally anisotropic semiconductor plates should be oriented perpendicularly to the direction of current flow. Such structurally anisotropic media are preferable to those with isotropic electrical conductivity (e.g., when the inhomogeneities are square conducting inclusions). A drawback to the use of such structurally anisotropic materials is the complex fabrication technology required, because the length of the lamellae should be much greater than their width. The analytical expressions derived here for the effective resistivity and sensitivity are illustrated graphically for the case of the "Weiss alloy" (InSb with 1.8% NiSb), showing good agreement between experiment and theory. While the parameters of such semiconducting elements of magnetoresistors can be controlled by using materials with an ordered arrangement of the inclusions, the choice of a particular composition must be dictated by the aggregate of desired characteristics. The use of inhomogeneous structures in specific designs extends the capabilities of optimizing magnetic field measurement instruments. Figures 5; references: 5 Russian.
[149-8225]

UDC 621.315.592

PROPERTIES OF SUBMICRON LAYERS PRODUCED IN PURE GERMANIUM BY ION-LASER METHOD

Leningrad FIZIKA I TEKHNIKA POLUPROVODNIKOV in Russian Vol 18, No 1, Jan 84 (manuscript received 14 Jul 83, signed to press 19 Jul 83) pp 62-67

VERBITSKAYA, Ye. M., VORONOVA, I. M., GORELOV, S. S., MAKSIMOV, Yu. P. and STROKAN, N. B. Institute of Engineering Physics imeni A. F. Ioffe, USSR Academy of Sciences, Leningrad

[Abstract] An experimental study of ion-alloyed layers in pure germanium was made in order to determine the feasibility of annealing them with single millisecond laser pulses and of configuring the laser radiation field appropriately for this purpose by simple means, using mirror-screen panels. The object of annealing, not attainable by conventional heat treatment and never considered before, was to produce submicron n^+-layers in extra-pure fermanium. The optical system designed and used for this study consisted of a GOS-30 neodymium laser (λ = 1.06 μm) or a GOR-100M ruby laser (λ = 0.694 μm) operating in the free-emission mode and two identical screen panels producing a sufficiently uniform intensity distribution. On each panel were mounted 19 mirrors with a 1000 mm radius of curvature and with independent alignment each. The first panel split the incident laser beam into separate light pencils, each mirror sending its light pencil to the corresponding mirror on the second panel and all light pencils reflected here collecting on a rotating mirror which projected the image of the first panel through a fluorite plate onto a screen. Layers of grade GSD-2a extra-pure n-Ge (electrical resistivity 47 ohm · cm) with (111) orientation were annealed with this apparatus, after implantation of 40 keV P^+-ions to a 10^{14} cm^{-2} level. Mechanical stresses caused by thermal shock were relieved by additional heating between successive laser pulses to a temperature sufficiently low (300°C) to preclude diffusion of adsorbed atoms and residual impurities. Crystallographic data obtained by x-ray structural analysis and electrophysical data based on the impurity concentration profile, the latter obtained by layerwise etching with a 3.5% KOH+ H_2O_2 = 10:1 mixture and subsequent resistance measurements by the 4-point method, indicate that this method of annealing is feasible with a high degree of reproducibility. The authors thank D. V. Tarkhin for discussing the results, M. Ye. Boyko for analyzing the layer structure, and Ye. V. Akimova for assisting with the measurements. Figures 4; references 15: 9 Russian, 6 Western.
[132-2415]

UDC 621.315.592

POTENTIAL BARRIER IN METAL-SEMICONDUCTOR-METAL STRUCTURES BASED ON CdTe

Leningrad FIZIKA I TEKHNIKA POLUPROVODNIKOV in Russian Vol 18, No 1, Jan 84 (manuscript received 14 Jul 83, signed to press 19 Jul 83) pp 68-71

ZELENINA, N. K., MASLOVA, L. V., MATVEYEV, O. A. and TOMASOV, A. A., Institute of Engineering Physics imeni A. F. Ioffe, USSR Academy of Sciences

[Abstract] Metal-semiconductor-metal rectifier structures based on CdTe crystals improve the spectrometric performance characteristics of Cdte nuclear-radiation detectors, but they are difficult to produce by the "cold" method. This problem is analyzed here on the basis of the energy-band diagram for such structures and evaluation of the potential barrier in accordance with current-voltage characteristics which have been measured with indium electrodes. The results reveal that the potential barrier on the surface of both n-type and p-type low-resistance CdTe crystals does not depend on the work function of the deposited metal, the Fermi level at the semiconductor surface thus being fixed somewhere within the forbidden band of the semiconductor. The effects of surface treatment prior to metal deposition indicate that the properties of the semiconductor surface, namely location and density of surface states, are determined by oxidation. Etching the surface with butyl bromide or chromium prior to vacuum evaporation of aluminum and gold results in somewhat different locations of the Fermi level at the semiconductor surface without metal, 0.65 and 0.56 eV, respectively, without much difference in the density of surface states. Etching the surface with butyl bromide and then cleaning it with argon ions in a glow discharge prior to cathode sputtering of aluminum and gold results in a dependence of the potential barrier on the work function of the metal and changes the structure of surface states with an attendant decrease of their density. Etching the surface with butyl bromide without subsequent cleaning prior to sputtering of metals lowers the potential barrier on both n-type and p-type crystals appreciably. It thus appears possible to control the location of the Fermi level at the semiconductor surface by treatment, particularly cleaning, of that surface. Figures 2; tables 2; references 10: 1 Russian, 9 Western (1 in Russian translation).
[132-2415]

UDC 621.315.592

RADIATION DEFECTS IN SILICON BOMBARDED BY NEUTRONS

Leningrad FIZIKA I TEKHNIKA POLUPROVODNIKOV in Russian Vol 18, No 1, Jan 84 (manuscript received 14 Jul 83, signed to press 19 Jul 83) pp 7275

ALEKSANDROV, L. N., ZOTOV, M. I., STAS', V. F. and SURIN, B. P.
Institute of Semiconductor Physics, Siberian Department, USSR Academy of Sciences, Novosibirsk

[Abstract] A relation between changes in electrophysical properties of silicon during heat treatment and structural defects resulting from attendant neutron bombardment is established on the basis of an experimental study with stress identification by the selectively sensitive method of internal friction. Specimens of dislocationless phosphorus-doped silicon (electrical resistivity 190 ohm · cm) grown by zone refinement in argon and pure silicon (electrical resistivity 100 ohm · cm) grown by the Czochralski method were bombarded with doses of 10^{14}-10^{18}cm^{-2} thermal neutrons + 10^{13}-10^{17}cm^{-2} fast neutrons at temperatures not exceeding 330 K. Electrical resistivity as well as carrier concentration and mobility were measured by the Van der Pauw method at room temperature. The specimens were annealed isochronously at temperatures from 370 to 1200 K, in 25 K steps for 15 min at each temperature. Internal friction was measured by the Foerster method at frequencies of 2-4 kHz while the temperature was raised at a constant rate of 0.05 K/s. The results reveal that the hole concentration rises first during annealing at 400-440 K and then again during annealing at 700-770 K, in the second stage beginning at a higher temperature and by a smaller amount in doped silicon than in pure one. The electron concentration was found to rise first during annealing at approximately 600 K and then again at approximately 900 K, already in the first stage by a smaller amount in both pure and doped silicon with larger neutron dose. The temperature dependence of internal friction reveals reorientation of defects characterized by a frequency and an activation energy level, indicating radiative point defects and causing the internal friction to peak upon annealing at certain temperatures. Four such peaks of magnitude proportional to the neutron dose were recorded corresponding to annealing temperatures and activation energy levels: A) 430 K, 0.72±0.05 eV; B) 500 K. 0.80±0.05eV; C) 600 K, 0.90±0.05 eV; D) 750 K, 1.3±0.2 eV (only in pure silicon). The authors thank V. A. Kharchenko, L. P. Khiznichenko and G. A. Gudayev for bombarding the silicon specimens with neutrons. Figures 4; references 9: 3 Russian, 6 Western (1 in Russian translation).
[132-2415]

UDC 621.382.2

STUDY OF DEEP LEVELS IN HOMOJUNCTIONS AND IN HETEROJUNCTIONS BASED ON GaAs BY METHOD OF TUNNEL SPECTROSCOPY

Leningrad FIZIKA I TEKHNIKA POLUPROVODNIKOV in Russian Vol 18, No 1, Jan 84 (manuscript received 28 Feb 83, signed to press 20 Jul 83) pp 76-78

VYATKIN, A. P., INOZEMTSEV, K. I., KALININ, Yu. M., KRIVOROTOV. N. P., LOMAKO, V. M. and NOVOSELOV, A. M., Siberian Institute of Engineering Physics imeni V. D. Kuznetsov, Tomsk State University, Tomsk

[Abstract] Tunnel spectroscopy was used in an experimental study of deep levels in homojunctions and in heterojunctions, the former having been produced by diffusion of Zn or Be in n-GaAs < Si,Ge,Sn,S,Te > ($n \sim 10^{17}$-10^{18} cm^{-3}) and the latter, n-GaAs < Si > /p^+-$Al_{0.2}Ga_{0.8}As$ < Ge> heterojunctions, having been grown epitaxially from the liquid phase with $p = 5 \cdot 10^{18}$ cm^{-3} during growth and with $n = (2\text{-}4) \cdot 10^{17}$ cm^3 during current-voltage measurements. The current-voltage characteristics of all junctions were found to be monotonic, their singularities associated with charge transfer through deep levels being revealed by their second derivatives. The corresponding tunnel spectra were measured at 77K by the method of harmonics. They contained generally only one singularity so that the voltage corresponding to inclusion of an i-conductivity channel could be reliably measured. The results indicate deep levels on both sides of diffused junctions. On this basis the mean hole and electron concentrations at the boundary of the space-charge region, as well as the local hole and electron concentrations in the tunneling region, can be calculated, the local concentrations reaching levels 2-4 times higher than the mean ones. This indicates that in 300-1000 Å wide barriers charge is transferred through deep levels where the junction is narrowed down as a result of nonuniform dopant distribution. Figures 2; tables 1; references 11: 6 Russian, 5 Western (1 in Russian translation).
[132-2415]

UDC 621.315.592

PROPAGATION OF MAGNETOPLASMA WAVES THROUGH VOLUME AND ALONG SURFACE OF SEMICONDUCTOR AT ANGLE TO EXTERNAL MAGNETIC FIELD

Leningrad FIZIKA I TEKHNIKA POLUPROVODNIKOV in Russian Vol 18, No 1, Jan 84 (manuscript received 16 May 83, signed to press 20 Jul 83) pp 79-82

LAURINAVICHYUS, A. and MALAKAUSKAS, P., Institute of Semiconductor Physics, LitSSR Academy of Sciences, Vilnius

[Abstract] Propagation of volume and surface magnetoplasma waves in semiconductors is analyzed, microwaves being considered because of the most easily

recognizable far-field conditions. The experiment was performed by the method of magnetic reflection, a narrow rectangular waveguide being used for exciting electromagnetic microwaves in a plane-parallel n-InSb specimen placed in an external magnetic field and cooled with liquid nitrogen. Reflection rather than transmission was observed, with a resonance depending on the magnetic field intensity without distortion by a forward signal. A slight Fabry-Perot resonance shift to lower magnetic field intensity was recorded as the waveguide was moved closer to one of the lateral surfaces of the specimen, indicating a higher phase velocity of surface waves. The field of a heliconic volume wave was found to decay fast beyond the exciting waveguide, indicating the existence of a longitudinal field component near the waveguide and the existence of a heliconic mode alone in the semiconductor within a few of its wavelengths only. Nonreciprocity of volume wave propagation as well as of surface wave propagation was established in the experiment. Inasmuch as all characteristics of surface wave propagation can be interpreted in terms of known volume magnetoplasma waves, it is still not possible to conclude definitively that surface magnetoplasma waves have ever been detected experimentally. Figures 3; references 17: 13 Russian, 4 Western.
[132-2415]

UDC 621.397.9

OPTOELECTRONIC TRANSDUCER FOR AUTOMATIC DETECTION OF OBJECTS

Leningrad IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: PRIBOROSTROYENIYE in Russian Vol 27, No 2, Feb 84 (manuscript received 3 Jan 83) pp 79-85

ANDREYEV, A. L., Leningrad Institute of Precision Mechanics and Optics

[Abstract] An optoelectronic transducer with a charge-coupled photoreceiver array is considered for automatic detection of objects with the aid of a large-scale integrated microprocessor. The television version of such a transducer includes input lens optics and a charge-coupled video oscillator with a light-sensitive surface on which the image of an object is projected, a sync generator controlling the oscillator with clock pulses, a video amplifier for the oscillator output signals which also clamps them to the corresponding "black" level, and a threshold device where those signals are compared with a reference level and logic "1" or "0" pulses are subsequently formed. These pulses are then processed by a space-time logic filter which consists of a pulse counter, two controlled frequency dividers, a computer, and a microprogram control driven by a code of selected filter parameters. When a priori data about the object are available, the format of rectangular discrete analyzer zones of the filter frome must be made maximum, but so that at least one of them will be completely inscribable in the object contour and the ratio of their sides be equal to the ratio of maximum horizontal

and vertical object dimensions. The parameters of such an optoelectronic transducer structure are optimized on the basis of conventional detection criteria, namely correct-detection and false-alarm probabilities, and the signal noisiness. Typical design and performance data are shown pertaining to an optoelectronic transducer with a medium-size (256 x 144 cells) array format and mXn = 5 x 5 discrete filter zones. With the addition of a general purpose microcomputer, this device can be made automatically adaptable to changing conditions of observation. Article was recommended by Department Faculty of Optoelectronic Devices. Figures 3; tables 1; references 2: 1 Russian, 1 Western (in Russian translation). [130-2415]

UDC 621.375.132

REAL AND POTENTIAL OUTPUT POWERS OF TRANSISTOR AMPLIFIERS

Moscow ELEKTROSVYAZ' in Russian No 2, Feb 84
(manuscript received 21 Mar 83) pp 52-55

KIBAKIN, V. M.

[Abstract] This paper notes that a considerable number of amplifiers which are used in station equipment for wire broadcasting are tube-type. Trial operation of low-frequency transistor amplifiers of average and large power indicate the inadequacy of their reliability in comparison with these tube types. Failure of transistors in the output stages frequently takes place, it would seem without noticeable reasons, during switching on or changing over of the supply voltage, commutation of the input or output circuits, short-duration overload of signals, etc. According to the paper, one of the causes of the inadequacy of the operational reliability of transistor amplifiers is the inaccuracy of existing methods for their rating (raschet). The output powers of a transistor amplifier with an active load and with a complex load are investigated. As a result the author concludes that the major factor which limits the maximum magnitude of the output power of a transistor amplifier is the complex nature of the load. In order to assure reliable operation of output transistors with a real load having an angle of the phase shift up to plus or minus 45°, the magnitude of the output power of the amplifier must be decreased by 4-5 times in comparison with a purely active load. With an increase of the supply voltage of the amplifier this relation increases. The magnitude of the output power of a transistor amplifier is an ambiguous function of the voltage and reaches maximum value only with an optimum value of the supply voltage. With an increase of the supply voltage above the optimum, the output power of the transistor amplifier must be reduced in order to assure reliability of its operation. Extremely low values of the real output power of a trnsistor amplifier during operation with a complex load predetermines the advisability of introducing limitations on the allowable deviation of the load

parameters, as well as on the spectrum and nature of the amplified signal, which gives the practical possibility of increasing the magnitude of the maximum power removable from the transistor amplifier. Such a calculation is the subject of a separate paper. Figures 3; references: 3 Russian.
[128-6415]

UDC 621.373.52

EXPERIMENTAL INVESTIGATION OF FLUCTUATIONS IN TRANSISTORIZED SELF-EXCITED OSCILLATOR WITH VARICAPS

Moscow ELEKTROSVYAZ' in Russian No 2, Feb 84
(manuscript received 25 Aug 82) pp 55-58

SAVCHENKO, M. P. and KULESHOV, V. N.

[Abstract] During their use in communication systems and high-performance measuring equipment, an important qualitative index of self-excited oscillators with varicaps is the level of fluctuations of the oscillation phases. An increase in the technical requirements on the qualitative index makes necessary an investigation of the causes of fluctuations and a survey of methods for their minimization. The paper presents the circuit of a self-excited oscillator and a method for measurement of fluctuations, the results of experimental investigations, and a consideration of these results. The authors conclude that replacement of one varicap by a combination of antiseries-connected varicaps equivalent to it with respect to capacitance makes it possible to obtain a gain in the signal-to-noise ratio only in the case where during this an increase does not take place in the amplitude of the high-frequency oscillations which are necessary at one varicap. In self-excited oscillators with varicaps an optimum oscillation amplitude exists with which a minimum signal-to-noise ratio is attained. An increase of the number of pairs of antiseries-connected varicaps, i.e., a decrease of the amplitude of the oscillations which are necessary at one varicap makes it possible to reduce the criticality of the minimum of the signal-to-noise ratio to changes of the oscillation amplitude and makes it possible to approach the levels of fluctuations inherent in self-excited oscillators without managers. The conclusions given are primarily concerned with self-excited oscillators, in the circuit of which any capacitance or, for the most part, is caused by controllable capacitance. Figures 4; references: 6 Russian.
[128-6415]

UDC 007.52:62-83.621.313

PERFORMANCE INDICATORS OF ELECTRIC SERVOMOTORS IN RPM-25 UNIVERSAL INDUSTRIAL ROBOT

Leningrad IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: PRIBOROSTROYENIYE in Russian Vol 27, No 2, Feb 84 (manuscript received 28 Mar 83) pp 26-29

BEKASOVA, A. M. and SLEPTSOV, V. V., Moscow Higher Technical School imeni N. E. Bauman

[Abstract] Universal industrial robots with simple and flexible modular construction require drives with special performance characteristics. Such a drive in a modern industrial robot consists of three standard modules: electric servomotor with speed regulation, controls, and mechanical coupling. The motor performance indicators are bandwidth and speed range. The performance of the control module is determined by its static characteristics which, in the case of a positioning drive, should preferably be parabolic. The performance indicators of the mechanical coupling, namely backlash, stiffness, and efficiency, determine the quality of the drive. A mathematical model of such a drive for the "lower swinging" coordinate in an RPM-25 industrial robot was constructed in the form of one algebraic and six differential equations, for simulation of transient processes on a digital computer. The results of calculations and of experimental evaluation indicate a trapezoidal velocity cycle and absence of overregulation, but also a long pull-in time and a large static error of the output coordinate. The pull-in time can be shortened by means of an additional velocity-setting relay signal for faster approach to the positioning point and a stronger velocity feedback at this point for prevention of overregulation. The static error, which depends on the external perturbation torque and on the friction torque, can be reduced by increasing the stiffness of the mechanical coupling. Article was recommended by Department Faculty of Automatic Systems and Robots. Figures 3; references: 1 Russian.
[130-2415]

UDC 007.52:621.757.077.001.24

METHOD OF DESIGNING COMPONENTS OF CONTROL SYSTEM WITH FORCE FEEDBACK FOR ASSEMBLY ROBOT

Leningrad IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: PRIBOROSTROYENIYE in Russian Vol 27, No 2,Feb 84 (manuscript received 26 Oct 82) pp 30-33

DEMIDOV, N. N., Moscow Higher Technical School imeni N. E. Bauman

[Abstract] One possible method of designing a control system with force feedback for an assembly robot is described, a method involving the use of a multicomponent force and torque transducer rather than the direct measurement of coordinates. The kinematic linkage of the automatic manipulator includes a worm-gear pair for converting rotation to translation and the feedback loop includes an amplifier. Fundamental design and performance relations are given, natural vibration modes of the transducer made of steel or bronze and self-excitation modes in the control loop being particularly important considerations. Transients of force as well as angular displacement and velocity have been calculated for a model operation such as assembly of sleeves on shafts with diameters ranging from 10 to 60 mm and with guaranteed 0.02 mm radial clearance. The results were used for construction of an experimental prototype. Article was recommended by Department Faculty of Automatic Systems. Figures 3; references: 4 Russian.
[130-2415]

UDC 621.397.6

CHOICE OF IMAGE RESOLUTION PARAMETERS IN TELEVISION SYSTEM FOR IDENTIFICATION OF GROUP OF POINT OBJECTS

Leningrad IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: PRIBOROSTROYENIYE in Russian Vol 27, No 2, Feb 84 (manuscript received 5 Mar 83) pp 3-7

RAKCHEYEV, D. P. and TOLSTIKOV, A. S., Leningrad

[Abstract] Identification of point objects in a group by a dissector television tube with uniformly transparent circular apertures is considered, and a method of selecting the image resolution parameters is proposed for estimation of an object's coordinates. The illuminance distribution over the image scattering circle is approximated as a two-dimensional Gaussian one, which upon numerical integration yields the amplitude of the relative signal. This amplitude depends on the ratios of aperture diameter (referred to photocathode) and of image-to-aperture, center-to-center distance to an arbitrarily defined diameter of the image scattering circle. The probability of this amplitude being equal to or larger than the detection threshold is estimated, taking into account movement of the image as well as dynamic nonuniformity of the object signal. Both effects can be compensated by overlapping the resolution circle in the television sweep. The probability of signal detection also depends on the ratio of maximum allowable image-to-aperture distance to step width of the radial sweep. Figures 2; references: 6 Russian.
[130-2415]

UDC 621.374

EXPERIMENTAL STUDY OF MAGNETIC FIELD DISTRIBUTION IN MASSIVE FLAT INDUCTOR SYSTEMS

Kiev TEKHICHESKAYA ELEKTRODINAMIKA in Russian No 1, Jan-Feb 84
(manuscript received 11 May 82) pp 101-103

BALTAKHANOV, A. M. and LOVENETSKIY, A. V.

[Abstract] The magnetic field induction distribution over the surface of massive inductors is studied using the following configuration: The energy store consists of 12 K-75-28 capacitors, switched by an IRT-2 ignitron. The maximum voltage is 3 KV, the capacitance is 1,200 microfarads, the inductance is 1.1 microhenries and the resistance is 7 milliohms. The inductors were flat multiturn inductances with an inside radius of 8 mm and an outside radius of 50 mm; they were made of copper straps 1 mm, 0.5 mm and 0.1 mm thick. The number of turns was 35, 66 and 171, respectively. The conductor was a copper disk 6 mm thick whose radial dimensions corresponded with the radial dimensions of the inductors. The gap between the inductors and the conductor was 3 mm so that the inductive sensor could move freely in the gap. The capacitor bank was charged up to 2 KV and the conductor was clamped. Oscilliscope traces of the discharge current and radial component of the magnetic field induction in the working surface of the inductor are shown as a function of time and radial distance. The measured values of the field amplitude in the gap between the inductor and the disk conductor for various inductor thicknesses are summarized in tabular form with the maximum discharge current being 13.0 KA and the minimum 1.3 KA. An asynchronous change is observed in the overall discharge current in the inductor and in the magnetic field over its surface. It is found that an optimal inductor thickness exists for which the field in the gap is a maximum and consequently the magnetic field pressure on the conductor is also a maximum. Figures 3; tables 1; references: 5 Russian.
[149-8225]

UDC 621.315.1:621.3.019.34

INFORMATIONAL MODEL FOR ANALYSIS OF FAULTS IN AUTOMATED 6-20 kV DISTRIBUTION NETWORK

Minsk IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: ENERGETIKA in Russian
No 12, Dec 83 (manuscript received 27 Sep 82) pp 19-23

NEGNEVITSKIY, M. V., engineer, Order of Labor Red Banner Belorussian Polytechnic Institute, and FAYBISOVICH, V. A., candidate of technical sciences, Belorussian Regional Administration of Power System Equipment Overhaul and Repair Management

[Abstract] An informational model has been developed for analysis of faults and design of protection in automated 6-20 kV distribution networks, on the basis of on-line inspection. A microcomputer yields status words corresponding to indirect symptoms of the fault condition and the circuit breaker condition, such as number of trips and closures, number of short circuit, current kicks, lengths of cycle interruptions. After the input of data, the algorithm of system analysis and protection in real time continues with identification of the fault and the circuit breaker status, whereupon either automatic reclosure or automatic standby cut-in is executed. The algorithm has been programmed in FORTRAN-4 for a YeS Unified System computer. With scan of all possible fault modes, the entire calculation can be completed within 5 min. Trial calculations were made for a 10 kV distribution network with two main circuit breakers and 2-step overcurrent protection, the point of standby tie-in dividing the line into two feeders. The article was presented by the Department Faculty of Electric Power Plants. Figures 1; references: 4 Russian.
[131-2415]

BUILDUP OF ELECTRIC CHARGE IN DIELECTRIC LIQUIDS DURING FILLUP

Minsk IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: ENERGETIKA in Russian
No 12, Dec 83(manuscript received 28 Apr 83) pp 51-54

MAYZEL', Yu. M., candidate of technical sciences, docent, and PLYUGIN, M. D., engineer

[Abstract] Buildup of electric charge in dielectric liquid fuels such as hydrocarbons during transfer from pipe or hose to receiver tank presents a hazard on account of possible sparking and ignition. A valid model of this process is an equivalent reversible Faraday cup. Three kinds of charge must be considered: primary volume charge $+Q_1$ built up after separation, by hydrodynamic forces, from the diffusion zone of the electric double layer, followed by secondary surface charges $-Q_2$ and $+Q_3$, induced respectively on the inside and the outside of pipe, filter, and tank walls. Grounding neutralizes only the outside charge, with the electric potential inside not always lowered, and sometimes even raised. For complete neutralization of all charges, through their relaxation, a device is proposed, effective also at high velocities of fuel flow. It consists of a metal sleeve around the pipe or hose with an insulating interlayer, along the straight segment not far from the spout or faucet, and a thin metal wire mesh on insulation inserted into the tank with an electrical connection to the pipe or hose. This device is designed to compensate for the change in capacitance occurring as the fuel level in the tank rises. Figures 1; references: 5 Russian.
[131-2415]

UDC 621.313

MORE EFFECTIVE USE OF SYNCHRONOUS-MACHINE PULSE GENERATORS IN ASYMMETRIC IMPACT AND SHORT-CYCLE MODES OF OPERATION

Novocherkassk IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: ELEKTROMEKHANIKA in Russian No 1, Jan 84 (manuscript received 28 Jan 83) pp 23-28

SIPAYLOV, G. A., doctor of technical sciences, professor; LOOS, A. V., doctor of technical sciences, professor; CHUCHALIN, A. I., candidate of technical sciences, senior instructor; LUKUTIN A. V., candidate of technical sciences, senior instructor; GORISEV, S. A., graduate student; and KASSIROV, V. M., graduate student. All from Tomsk Polytechnic Institute.

[Abstract] A fundamental way to increase the pulse power and the energy conversion efficiency in a synchronous machine as an energy storing device and generator during impact and short-cycle operation is to boost the main magnetic flux in the air gap and to reduce the inductance of the air gap so as to reduce also the magnetic leakage flux. Sequential switching of the stator phase has been proposed and, in the case of a wound field, also sequential switching of the rotor coils for further

improvement of the performance. The load characteristics of such a machine stepwise feeding a single-phase inductive load, with winding layout and connections designed to produce that necessary distribution of magnetic fluxes, are calculated on the basis of conventional machine theory and transient analysis. The results indicate that heavy power pulses of millisecond duration are attainable with such a scheme. Figures 6; references 9: 8 Russian, 1 Western (in Russian translation).
[144-2415]

UDC 621.313.322

WIND POWER PLANT WITH ASYNCHRONOUS-SYNCHRONOUS GENERATOR

Novocherkassk IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: ELEKTROMEKHANIKA in Russian No 1, Jan 84 (manuscript received 28 Jan 83) pp 29-33

SHAPIRO, L. Y., candidate of technical sciences, docent, and ASTORGA, V. I., engineer; both from Moscow Institute of Power Engineering

[Abstract] Various schemes are being developed for utilization of wind power as a source of electric energy, most practical and effective being connection of several wind power plants into a network, and tie-in of the latter to the existing conventional power grid. Although operation of a wind power plant with constant-speed generators requires large and heavy equipment, which reduces both availability and reliability, operation with variable speed generators usually requires frequency converters and thus is less economical. Elimination of frequency converters from the power line would combine more availability and higher reliability of variable-speed operation with better overall efficiency and economy. Using an asynchronous-synchronous generator is proposed, operating with as much as a ±20% speed variation. This is an induction machine with wound rotor, the latter connected through a frequency converter to a matching transformer, and a stator connected directly to the outgoing power line. Although conventionally made with brushes and slip rings, it can be constructed in a brushless version without all of the problems associated with sliding contacts. Its mass and size, including those of the frequency converter, are smaller than those of of a synchronous generator with those of a synchronous generator with frequency converter in the power line. It can generate or draw reactive power, and its speed can be smoothly regulated in both directions from nominal through adjustment of the frequency of the rotor current, for optimum operation of the plant under varying conditions. The performance characteristics of this generator match the aerodynamic characteristics of the wind motor which drives it and is limited by its own torque-developing capacity. Its design criteria should be maximum annual energy output in a give geographical region and normalized cost. Figures 3; references 3: 2 Russian, 1 Western (in Russian translation).
[144-2415]

PROBLEMS OF ELECTRICAL CONVERTER ENGINEERING: THIRD ALL-UNION SCIENTIFIC AND TECHNICAL CONFERENCE

Kiev TEKNICHESKAYA ELEKTRODINAMIKA in Russian No 1, Jan-Feb 84 pp 104-105

ISAKOV, V. N., candidate of technical sciences

[Abstract] The Third All-Union Scientific and Technical Conference "Problems in Conversion Engineering" was held in Kiev, October 11-13, 1983. About 350 specialists from scientific research and planning organizations in 59 cities participated. Some 15 papers prepared by leading specialists in the USSR were read at 6 sessions and 492 reports were submitted for discussion. The chairman of the organizing committee of the conference and director of the Institute of Electrodynamics of the UkSSR Academy of Sciences, A. K. Shidlovskiy, discussed the state of the art in the design of converter and inverter equipment in the USSR. He emphasized that there are a number of unresolved problems in electrical power conversion engineering: There are too few theoretical studies of a general nature; development of computer-aided design techniques for converters as well as methods of reliability analysis and determining the status of converters is going too slow; the pace and scope of work on the design of control, safety and monitoring systems for conversion equipment based on microprocessors and microcomputers are inadequate. The main task confronting specialists is the design of high efficiency semiconductor power devices and converters. Deputy director of the "Preobrazovatel'" All-Union Scientific Research Institute, F. S. Kovelev, devoted a paper to questions of improving the efficiency of conversion equipment. He noted that the level of development and production of new semiconductor devices, power control circuits and automation hardware does not always assure system reliability. The need for simpler, better optimized sesigns is noted. G. A. Ashkinaze ("Tallin Electrotechnical Plant imeni M. I. Kalinin" Production Association and Scientific Research Institute) considered the problem of designing new high-power semiconductor devices and the prospects for their application to conversion equipment. Other papers dealt with problems of analyzing converters with fixed and variable structures, the design of transformer and switch actuating structures for AC converters, estimates of the efficiency of power conversion in rectifier type converters, the development and introduction of converters for modern electrical equipment. New developments in the field of regulated current systems were treated in the paper by I. V. Volkov (Institute of Electrodynamics of the UkSSR Academy of Sciences). The conference adopted a resolution which set the

task of assuring a fast pace for the introduction of research results into the economy and the design of new, high efficiency power semiconductor devices and converters based on state-of-the-art engineering. The conference thought it appropriate to plan the next fourth such all-union conference for 1987.
[149-8225]

CSO: 1860

- END -